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**FREEDOM™ MRL-MB and MR Elevators
MR ACPM 2:1
MR Geared 1:1**

Installation and Maintenance

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Important Precautions and Useful Information

This preface contains information that will help you understand and safely maintain MCE equipment. We strongly recommend you review this preface and read this manual before installing, adjusting, or maintaining Motion Control Engineering equipment. This preface discusses:

- Safety and Other Symbol Meanings
- Safety Precautions
- [In This Guide](#)

Safety and Other Symbol Meanings



Danger

This manual symbol is used to alert you to procedures, instructions, or situations which, if not done properly, might result in personal injury or substantial equipment damage.



Caution

This manual symbol is used to alert you to procedures, instructions, or situations which, if not done properly, might result in equipment damage and potential nullification of equipment warranty.

Note



This manual symbol is used to alert you to instructions or other immediately helpful information.

Safety Precautions



Danger

This equipment is designed to comply with ASME A17.1, National Electrical Code, CE, and CAN/CSA-B44.1/ASME-A17.5, and other applicable codes and must be installed by a qualified elevator contractor. It is the responsibility of the elevator contractor to make sure that the final installation complies with all local codes and is installed in a safe manner.

This equipment is suitable for use on a circuit capable of delivering not more than 10,000 rms symmetrical amperes, 600 volts maximum. The three-phase AC power supply to the Drive Isolation Transformer (if applicable) used with this equipment must originate from a fused disconnect switch or circuit breaker sized in conformance to all applicable national, state, and local electrical codes in order to provide the necessary motor branch circuit protection for the Drive Unit and motor. Incorrect motor branch circuit protection will void the warranty and may create a hazardous condition.

Proper grounding is vitally important to safe and successful operation. Ground equipment as indicated in construction drawings and controller job prints. You must choose the proper conductor size and minimize the resistance to ground by using the shortest possible routing. See National Electrical Code Article 250-95 or the applicable local electrical code.

Before applying power to the controller, physically check all the power resistors and other components located in the resistor cabinet and inside the controller. Components loosened during shipment may cause damage or fail to function properly.

For proper operation of the AC Drive Unit in the controller, you must make sure that: 1) A direct solid ground is provided in the machine room to properly ground the controller and motor. Indirect grounds such as the building structure or a water pipe may not provide proper grounding and could act as an antenna to radiate RFI noise, thus disturbing sensitive equipment in the building. Improper grounding may also render any RFI filter ineffective. 2) The incoming power to the controller and the outgoing power wires to the motor are in their respective, separate, grounded conduits. Refer to construction drawings and to elevator job prints for grounding instruction.

This equipment may contain voltages as high as 1000 volts. Use extreme caution. Do not touch any components, resistors, circuit boards, power devices, or electrical connections without ensuring that high voltage is not present.

In This Manual:

This manual is the installation guide for the MCE elevator package. When viewed online as a pdf file, hyperlinks (buttons or blue text) link to related topics and informational websites. The manual includes:

- [Contents](#): Table of Contents. When viewed online as a pdf file, hyperlinks in the Contents link to the associated topic in the body of the manual.
- [Section 1](#). Package Description and Site Readiness
- [Section 2](#). Overhead and Rails
- [Section 3](#). Platform and Hoistway
- [Section 4](#). Entrances, Car, and Positioning System
- [Section 5](#). Operation, Preinspection, OEM inclusions
- [Section 6](#). Maintenance
- [Index](#): Alphabetical index to help you find information in the manual. When viewed online as a pdf file, index entry page references are hyperlinks to the associated information in the body of the manual.



Before beginning work!

Review the following documents:

- MCE Freedom Installation and Maintenance (this document)
- MCE Motion 4000 or iControl Controller manual (as appropriate)
- Elevator Machine manual
- MCE Construction Drawings
- MCE Assembly Drawings
- MCE Controller Job Prints
- Elevator Cab Drawings
- Elevator Entrance Drawings
- Elevator Fixture Drawings

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Install Overview

When installing an elevator, the order in which a particular team proceeds will vary with their common practices and with the state of building construction when installation begins.

Preparation

- Inventory all material on the job site and store it in a secure, clean, dry location. MCE standard warranty to apply.
- Clean the elevator pit of all debris.
- Refer to construction drawings and Section 1 of this guide and ensure that the pit and hoistway have been properly constructed. If the hoistway does not meet the requirements of the construction drawings, elevator construction should be postponed until the hoistway is brought into compliance. Site validation is the responsibility of the Elevator Contractor.



For MRL installations, we highly recommend that the machine beams and machine be hoisted into place using a crane. With prior coordination, MCE will arrange for the necessary materials to be delivered early.

Rail Installation

- Place car and counterweight pit channels.
- Construct a target assembly in the pit for guide rail installation “plumb” wires.
- Construct an overhead target assembly for guide rail installation “plumb” wires.
- Install “plumb” wires from overhead target assembly to pit target assembly and tension properly with weights or traction devices.
- Create a matrix that notes measurements from the car and counterweight guide rail installation wires to the walls or beams at each floor.
- From the matrix dimensions, determine that the hoistway is the correct size and is within 1-inch of plumb per 100-feet of rise. Guide rail installation wires can be pulled very slightly to accommodate minor discrepancies in measurements. **More serious dimension problems will have to be corrected by the General Contractor.**
- Install the first guide rail brackets for car and counterweight at pit level.
- Install the first round of car and counterweight guide rails. Be sure to reference Construction Drawings. **Cut “starter” rails may be required.**
- Build the false car with the suspension cable securely attached to the overhead.
- Work up the hoistway, continuing to install car and counterweight guide rail brackets and guide rails as you rise.
- When the last round of guide rails are installed at the top of the hoistway, tram the guide rails on the way back down to the bottom. Adjust as necessary.

Machine, Platform, Counterweight, and Rope

- Install the machine beams and machine using the Construction drawings, guide rails, and guide rail to rope dimensions for proper alignment.
- If three-phase power is not available, continue using the false car for installation. If three-phase power is available, place the false car above and install the car and counterweight buffers, safety plank, sheave beam, stiles, crosshead, platform, brace rods, and roller guides.
- Install the counterweight frame and roller guides. Hoist the counterweight frame to a predetermined spot in the hoistway and secure to the counterweight rail brackets with cable slings or acceptable rigging.
- Install the hoist ropes, governor, governor tension sheave, and governor rope.
- Using the false car, install sufficient counterweight fillers to counterbalance the weight of the platform and approximately 50% of a 1000 pound working capacity. Consult your MCE Project Manager for weight stack count to achieve the desired work capacity.

Running Platform

- Install the elevator controller and wire to 3-phase power.
- Wire machine, encoder, and brake to controller.
- Install temporary run buttons from platform to controller (provided by others). Wire governor switch and safety switch in series with the Enable button.
- Adjust the control to operate at Inspection speed.
- Once the working platform can be moved and the governor and safeties have been tested for slow speed temporary operation, the false car can be removed.
- Use the running platform to distribute all entrance frames, sills, struts, headers, hoistway doors, and related hardware to each floor.
- Start at the top, working down, installing all hoistway door equipment at each opening except the bottom floor. The bottom floor should be left open to allow installation of the elevator cab. Site conditions may vary this sequence.
- Install all hoistway equipment, traveling cable, raceway, conduit, fixtures, switches, and hoistway wiring.
- Install the cab, door operator, and car doors.
- Finish the bottom floor entrance.
- Install all equipment in and on the car top.
- Finish car and hoistway wiring.
- Complete controller wiring according to MCE controller drawings.

Commissioning

- Adjust the car using all required tools, instruments, and manuals.
- Conduct pre-inspection testing as described in the controller manual. Call your MCE Project Manager during pre-inspection testing to ensure all required tests are rehearsed with acceptable results.
- Conduct an acceptance test witnessed by the Code authorities.
- Correct all punch list items. Schedule re-inspection if necessary.
- The elevator installation is now ready to be turned over to the owner.



Motion Control Engineering®

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Package Description & Site Readiness

In This Manual

This manual describes installing a FREEDOM™, MB Series, machine beam supported, traction elevator package from MCE.

- Section 1. Package Description and Site Readiness
- [Section 2](#). Overhead and Rails
- [Section 3](#). Platform and Hoistway
- [Section 4](#). Entrances, Car, and Positioning System
- [Section 5](#). Operation, Preinspection, OEM inclusions
- [Section 6](#). Maintenance

Note



This manual describes a “typical” elevator package. On many jobs, differences in hoistway construction and geometry will require alternative solutions. Always refer to the final construction drawings package specific to the installation.

In addition, we recommend the “INSTALLATION MANUAL, Basic Field Practices” guide by Kermit Kraus for detailed technical instructions and common field practices, ISBN 1-886536-48-1.

In This Section

This section provides a description of the elevator package contents, including:

- Hardware Packages
- Supporting Documentation [1-3 ->](#)
- Options [1-4 ->](#)

Before you begin elevator package installation, the job site must be correctly prepared. Work by others that should be complete and checked:

- Hoistway Shaft/Well
- General Electrical
- Equipment Storage Conditions
- Safety and Code Compliance

Hardware Packages

The MCE elevator package includes all major components required to complete an elevator installation.

- Overhead: Machine beams, machine, associated hardware.
- Rail hardware: Rails, fishplates, rail brackets, pit channels, hardware.
- Sling & Hoistway: Buffers, sling and platform, counterweight assembly, counterweight fillers, governor, ropes, rope shackles.
- Electrical: Traveler cable, hoistway cable, hoistway switches, rescue equipment, controller, isolation transformer, hanging and mounting hardware.
- Cabs and fixtures: Cab components, entrances, fixtures.
- Supporting documentation and data tags.

Shipment Verification

With each shipment, a contents list will be provided. Verify and note on the lists the completeness of the order. Contact the shipping company and MCE immediately upon discovering any shortage or incorrect component.

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Supporting Documentation

- 42-02-EP01: Elevator Installation & Maintenance Manual: This manual. Will be delivered with or before first package.
- Drawings package: Site, layout, mechanical, and assembly drawings. Will be delivered with first package or as scheduled.
- Job Prints: Electrical connections for controller and all peripherals. Will be delivered with controller.
- Controller Manual: Electrical installation and connection instructions for controller. Physical and electrical install instructions for positioning system, load weigher. Configuration and adjustment instructions for controller/drive. Diagnostics and troubleshooting information for controller and connected equipment. Will be delivered with controller.
- Machine Instruction: Technical information about the machine. Will be delivered with machine.
- Door Operator: Install instructions for door operator. Delivered with operator.
- Options: Depending on the specific option, it may be documented in the elevator controller manual or in a stand alone manual accompanying the option.

Optional Equipment

Available options include:

- **Serial Car Operation Panel Interface:** Circuit board or boards, usually mounted in the control panel, that serialize button and switch inputs from the car operating panel allowing the information to be communicated to the elevator control or dispatcher through a shielded, serial cable rather than through numerous, discrete wires.
- **Serial Hall Calls:** Multiple node boards (one per hall call panel). Node boards are connected along a serial bus. The benefit is again reduced wiring requirements.
- **Seismic sensor:** Detects horizontal and vertical accelerations associated with earth movements, signals controller, and sounds a warning.
- **Counterweight derailment detector:** “Ring and string” counterweight derailment detector signals controller if counterweight moves significantly.
- **Load weigher:** Load weigher inputs can be used to make dispatching decisions based on car load or to make anti-nuisance decisions based on car load, registered calls, and photo eye information.
- **Security:** Car call and/or landing call restrictions and/or card reader interface.
- **Monitoring:** Hardware and software to support monitoring through MCE iMonitor or third party application.
- **Reporting:** Hardware and software to support reporting and data archival through MCE iReport application.
- **BMS-LINK:** Hardware and software to support connection to building automation/management application. Allows limited control and ability to manually or automatically scale the number of running elevators to meet energy targets weighed against passenger demand.
- **Regenerative drive:** Addition of a small secondary drive that returns power generated by overhauling to the mains providing power to the primary elevator drive.
- **TAPS:** Traction Auxiliary Power Supply provides rescue power to elevator if commercial power fails, automatically returning the car to a floor and permitting passengers to exit.
- **Passenger rescue assist system:** Remote machine brake lift and hoistway camera allow you to “drift” the car to a door zone and manually open the doors.

Hoistway Qualification

Smooth running, trouble-free elevators demand a well constructed hoistway:

- Check hoistway and opening dimensions
- Check that all embedded steel work is as specified
- Check pit and overhead clearances
- Check that control, machine, and drive spaces are as specified
- Check that proper power and disconnects are in place
- Check that access hatches are as specified
- Check that appropriate code requirements have been met

Work By Others

The following preparatory work is required in order to properly install the elevator equipment. The cost of this work is not included in the elevator equipment quotation.

1. Provide adequate on-site refuse containers for the disposal of elevator packing material. Should adequate containers not be provided, the removal of the elevator packing material shall become the responsibility of the Buyer.
2. Proper lighting in all work areas.
3. A plumb and legal hoistway, to within one inch of plumb per 100 feet with no dimension smaller than shown on drawings, properly framed and enclosed and including a pit of proper depth, and a pit ladder for each elevator. Hoistway, pit and overhead dimensions to be as specified on MCE's approved final layout drawings. Pit floor to support impact loads shown on drawings. Pit floor to be substantially level. Drains, sump, sump pump, lights, light switches and electrical outlets, access doors, waterproofing, access walks, handrails and hoistway ventilation as required.
4. Clear, flat, vertical or horizontal surfaces for mounting rail brackets at any location noted on MCE's approved final layout drawings shall be in the same vertical plane as the clear hoistway line. This includes divider beams between cars for multiple elevators in a common hoistway.
5. Adequate supports for foundations to carry the loads of all equipment, including overhead machine, machine beams located in hoistway and guide rail brackets from pit floor to the top of the hoistway and not spanning further than allowed by the governing code authority. When maximum bracket span is exceeded additional support shall be provided at Buyer's expense. Any bracket mounting surface that is not in line with the clear hoistway dimension detailed on MCE's approved final layout drawings may need to be extended to meet the proper dimension.
6. Provide a code compliant control closet or control room with access and ventilation in accordance with all applicable codes and regulations. The control closet or control room shall be maintained at a temperature between 32° F (0° C) and 104° F (40° C). Relative humidity not to exceed 95% non-condensing. Please validate that local codes do not require a tighter temperature range or higher ventilation requirements. If the control location will exceed these parameters, please contact your MCE representative for control enclosure options. Provide lights, light switches and electrical outlets as required.

7. Complete three phase connections from the electric power mains to each controller, including necessary circuit breakers and/or fused mainline disconnect switches along with compliant piping and conduit. Each car shall also include an earth ground. Materials and installation shall meet all applicable national and local electrical codes.
8. Single phase 120 VAC power for car lighting and alarm circuit provided to each controller, including necessary circuit breaker and/or fused disconnect switches along with compliant piping and conduit. Materials and installation shall meet all applicable national and local electrical codes.
9. Temporary power shall be provided without cost to the elevator contractor during construction and shall match all characteristics of the permanent power supply.
10. Divider beams for rail brackets shall be provided as required by code and design requirements as noted on job specific Shop Drawings.
11. Blockout/cutout through wall as required, to accommodate hall button boxes, signal fixtures, hatch duct, governor access doors and rope drops in machine room.
12. Cutting of walls, floor, etc. and removal of such obstructions as may be necessary for proper installation of the elevator.
13. Provide for any repairs such as grouting, patching and painting made necessary by such cutting.
14. Grouting of door sills, hoistway frames and signal fixtures after installation of the elevator equipment.
15. All painting, except for factory MCE primer and paint.
16. Provide finished floor marks visible from hoistway openings at all landings.
17. 75 ° bevels on all projections, recesses or setbacks over 4 inches except for sides used for loading and unloading.
18. Sumps and/or sump pumps (where permitted) located within the pit may not interfere with the elevator equipment.
19. Provide hoistway walls designed and constructed in accordance with the required fire rating (including those places where elevator fixture boxes, rail bracket fastenings or any other object requires penetrations into the hoistway walls).
20. Temporary enclosures, barricades and other protection for open hoistways and elevator work area during the time the elevator is being installed, to meet all installation safety codes.
21. Smoke detectors/sensing devices and contacts wired to elevator control, as required by local code. A means to automatically disconnect the main line power supply to the elevator, prior to the application of water in the elevator control closet or control room will be furnished by the electrical contractor. This 'means' shall not be self resetting.
22. All telephone wiring to the control panel and installation of telephone instrument or other communication equipment in the elevator cab with all connections to the elevator in the control closet or control room.
23. A hoist beam located as indicated on MCE's approved final layout drawings. The hoist beam shall be capable of supporting the load requirement noted on the MCE Shop Drawings.
24. A standby power source shall be provided, including necessary transfer switches and auxiliary contact, where elevator operation from an alternate power supply is required.

25. Provide 15-amp 120V AC fused service with ground (supplied through automatic emergency lighting supply if available in building) connected to each elevator signal control cabinet for car lighting.
26. Provide all fire alarm initiating signals as required by all national, state and local codes for termination at the primary elevator signal control cabinet in each group.
27. Adequate storage facilities for elevator equipment shall be provided prior to and during installation at the ground level within close proximity to the elevator hoistway.
28. Installation of anchors, embeds and sleeves.
29. Dried in hoistway(s) and machine/control room(s). Any water damage to elevator materials will be subject to MCE's warranty conditions.
30. Sill angles if required.
31. In locations where there is a difference in elevation between the floors of adjacent pits, a metal guard is to be installed to not less than 79" above the level of the higher pit floor. If a difference in elevation is 24" or less a standard railing is acceptable.
32. Sufficient supports for machine beams, including wall pockets and patching after beams are set in place. Building interface and mounting of beams to be per MCE's requirements as indicated on MCE's approved final layout drawings.

* Refer to quote and drawings for additional materials to be supplied By Others.

MRL Control Space

1. An enclosed and protected control space is to be provided in compliance with local elevator and building codes. Walls are to have a two hour fire rating or a rating which meets local code.
2. Access to the control space is to be safe and convenient. It must not obstruct hallways or emergency exits. A 42" space is required in front of the control space door for service barriers. Barricades shall be provided in the case of closet controller space. The barricade shall provide a minimum of 39" of working space. The barricade shall be capable of withstanding 250 lb-f with less than ½" of deflection. It shall also be fastened to the floor in such a way as to prevent movement if horizontal force is applied.
3. Temperature control and ventilation are required in the control space. Temperature is to be maintained between 32F and 104F, with relative humidity not to exceed 95% (non condensing).
4. The access door shall be self closing and self locking. The access door shall be openable from the inside without a key.
5. The access door shall have the same fire rating as the walls of the control space.
6. The lock and keying system for the control space door shall conform to locally applicable building and elevator codes. Requirements should be coordinated with the elevator contractor.
7. The control space door shall be labeled "MRL Elevator Control Space".
8. A permanent light fixture and switch conforming to local elevator code shall be installed in the control space.
9. A GFCI-protected convenience outlet conforming to local elevator code shall be installed in the control space.
10. A separate 120 volt, 20 amp fused, grounded service with a GFCI protection shall be provided for car lighting and power.

11. A dedicated telephone line is to be terminated in the elevator controller cabinet.
12. A permanent means of communication between the control space and the car shall be provided, if the control space is separate from the hoistway. See A17.1-2007 section 2.7.8



Caution

Elevator equipment is not designed to be exposed to the weather. Equipment must be in a dry, protected area, 32 to 104 degrees Fahrenheit. Moisture must not condense on equipment. If conditions are not adequate, consult MCE about special NEMA rated enclosures.

Storage Conditions

A clean, dry, secure storage area must be provided. Iron work, machines, and controllers will be damaged by exposure to the elements.

Safety and Code Compliance

- Elevator equipment must be installed by personnel with the proper certification for each facet of the job.
- All pertinent local and national codes must be adhered to.



Danger

Heavy equipment, hoisting, and high voltages are extremely dangerous. Accidents can easily result in death or serious injury. It is the responsibility of the installer to ensure that all applicable workplace safety regulations are strictly enforced, that all equipment is suited to the task and well maintained, and that all personnel are appropriately trained and certified.

Safety

Certain fundamental warnings must be kept in mind at all times to help avoid accidental death, severe personal injury, or equipment damage.

- Equipment may only be installed by qualified, licensed, trained elevator personnel.
- Always take proper precaution against falling. Harnesses should be worn at all times when working in the hoistway. If you are working over an opening to the hoistway, keep it covered for safety.
- Secure tools with tethers to prevent a falling tool from endangering personnel.
- Always use appropriate warning signs or tape around working areas. Secure doors that might allow entry by unauthorized persons.
- Verify safety devices (limits, governors, hoistway locks, car gate, etc.) are fully functional before running the elevator. Never operate controls with any safety device inoperative.
- The user is responsible for complying with the current National Electrical Code with respect to the overall installation of equipment and proper sizing of electrical conductors.
- The user is responsible for understanding and applying all current local, state, provincial, and federal codes that govern practices such as controller placement, applicability, wiring protection, disconnections, over-current protection, and grounding procedures.
- Equipment is at line voltage when AC power is connected. Never operate controls with covers removed from drive or brake controls.
- After AC power has been removed, internal capacitors can remain charged for up to 5 minutes. Wait at least 5 minutes after power down before touching any internal components.
- To prevent the risk of shock, all equipment should be securely grounded to earth ground as described in the National Electrical Code and applicable local codes. Ground conductors should be as large or larger than the primary AC power feeders for the equipment. Failure to obtain an actual earth ground may result in electrical shock to personnel.
- When using test equipment (oscilloscopes, etc.) with a power cord that electrically ties probe common to earth ground, an isolation transformer should be used to isolate the instrument common from earth ground.



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Overhead and Rails

In this section

This section describes hoistway installations, including:

- Structure Overview [2-2 ->](#)
- Overhead Installation [2-4 ->](#)
 - Supporting beams [2-5 ->](#)
 - Machine [2-6 ->](#)
 - Hitch plates [2-11 ->](#)
- Rail Installation [2-12 ->](#)
 - Materials [2-12 ->](#)
 - Layout [2-18 ->](#)
 - Pit Buffer Channels and Car Rails [2-19 ->](#)
 - Counterweight Rails [2-20 ->](#)

Note



In addition to the instructions in this manual, detailed installation drawings are provided on a per job basis and are always the controlling document should there be a difference between the manual and the drawings.

Structure Overview

Structural drawings for MRL2:1 and overhead machine room 2:1 are shown in this section.

Figure 2.1 Structure Overview, MRL 2:1, Double Hoistway

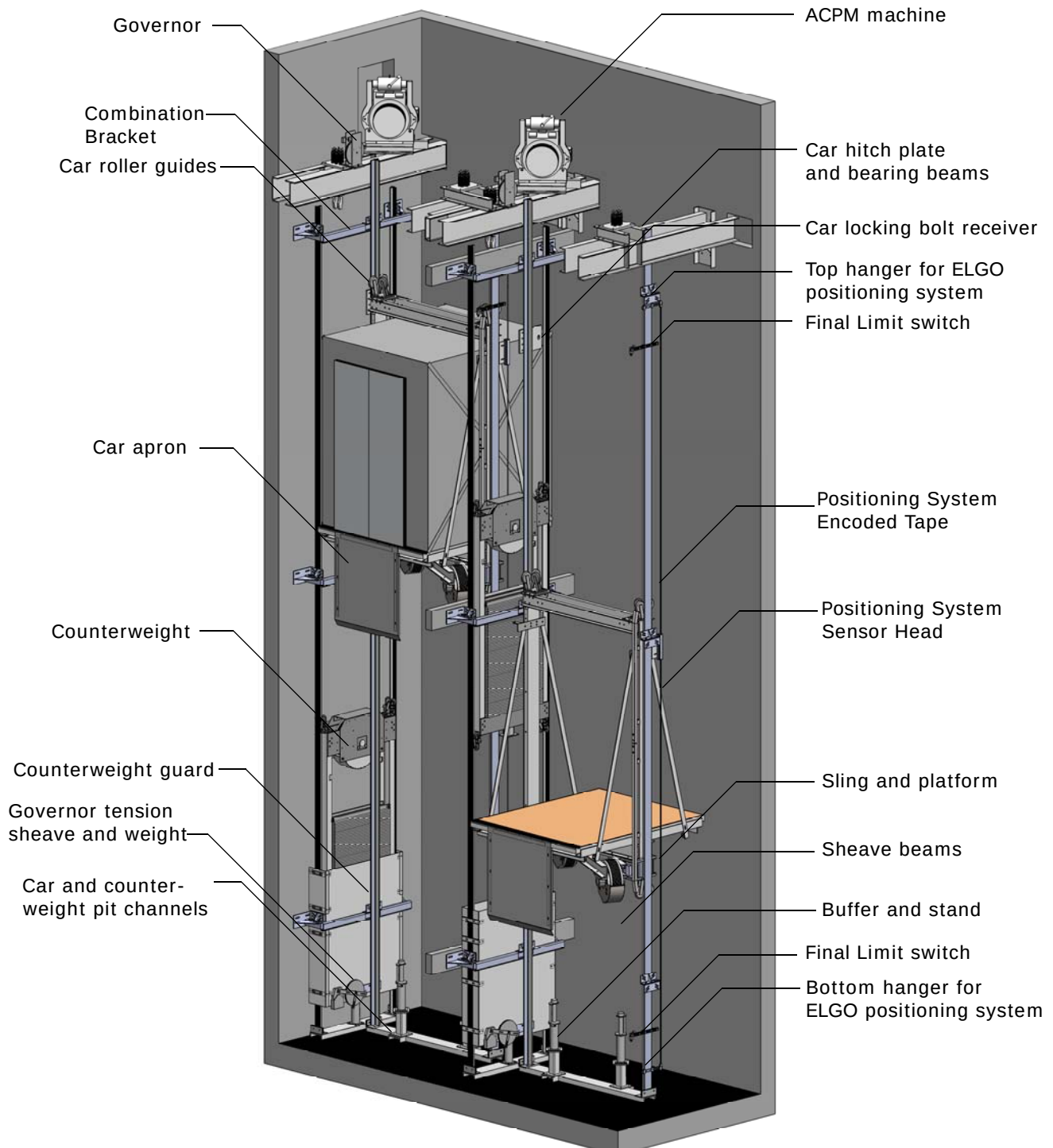
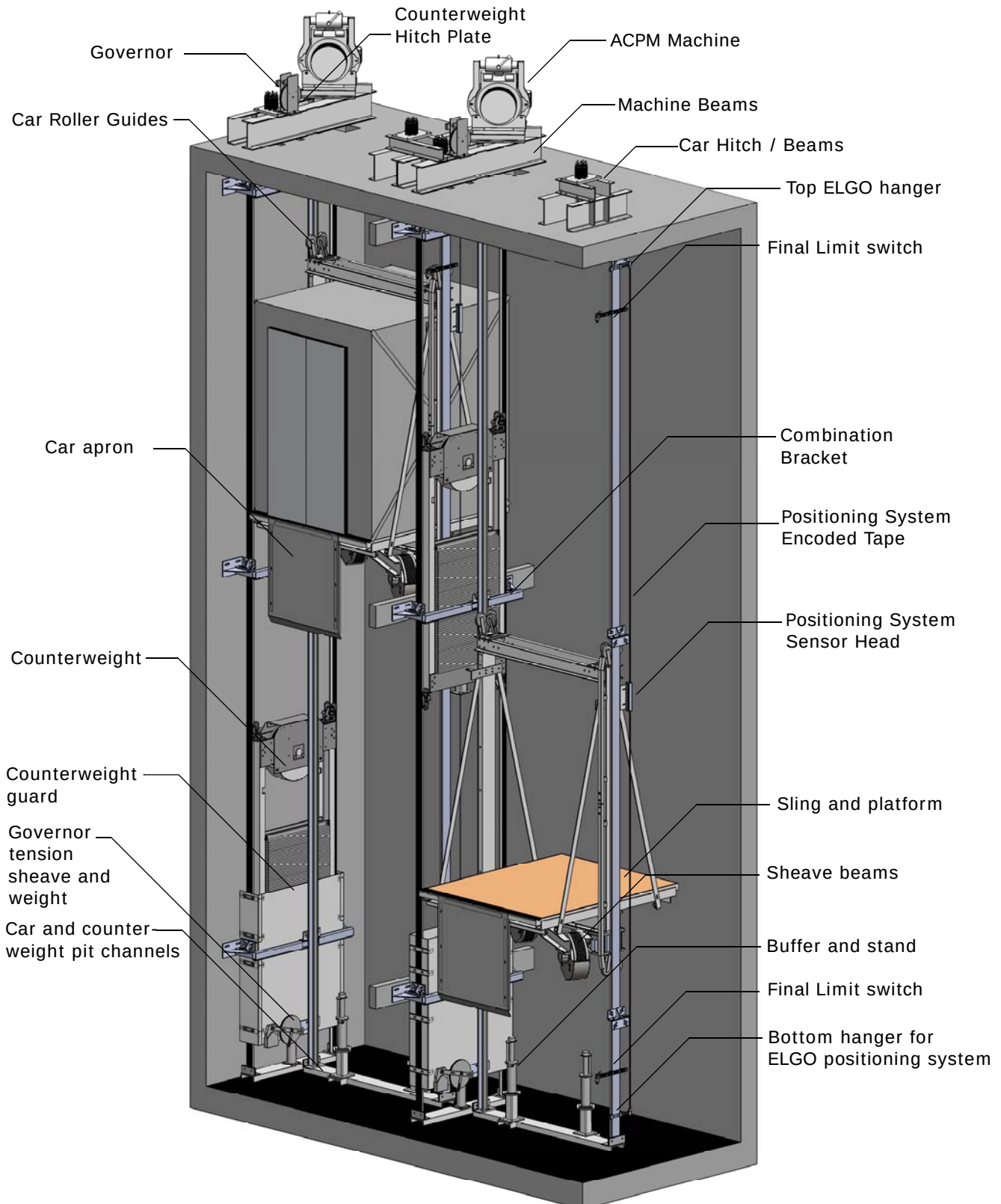


Figure 2.2 Structure Overview, Overhead Machine Room 2:1, Double Hoistway



Overhead Installations

This section describes those overhead supports and machinery provided for a typical installation. Different hoistway constructions may require alternative support structures. See your drawings package for specific equipment provided.

Figure 2.3 Typical MRL Overhead Layout

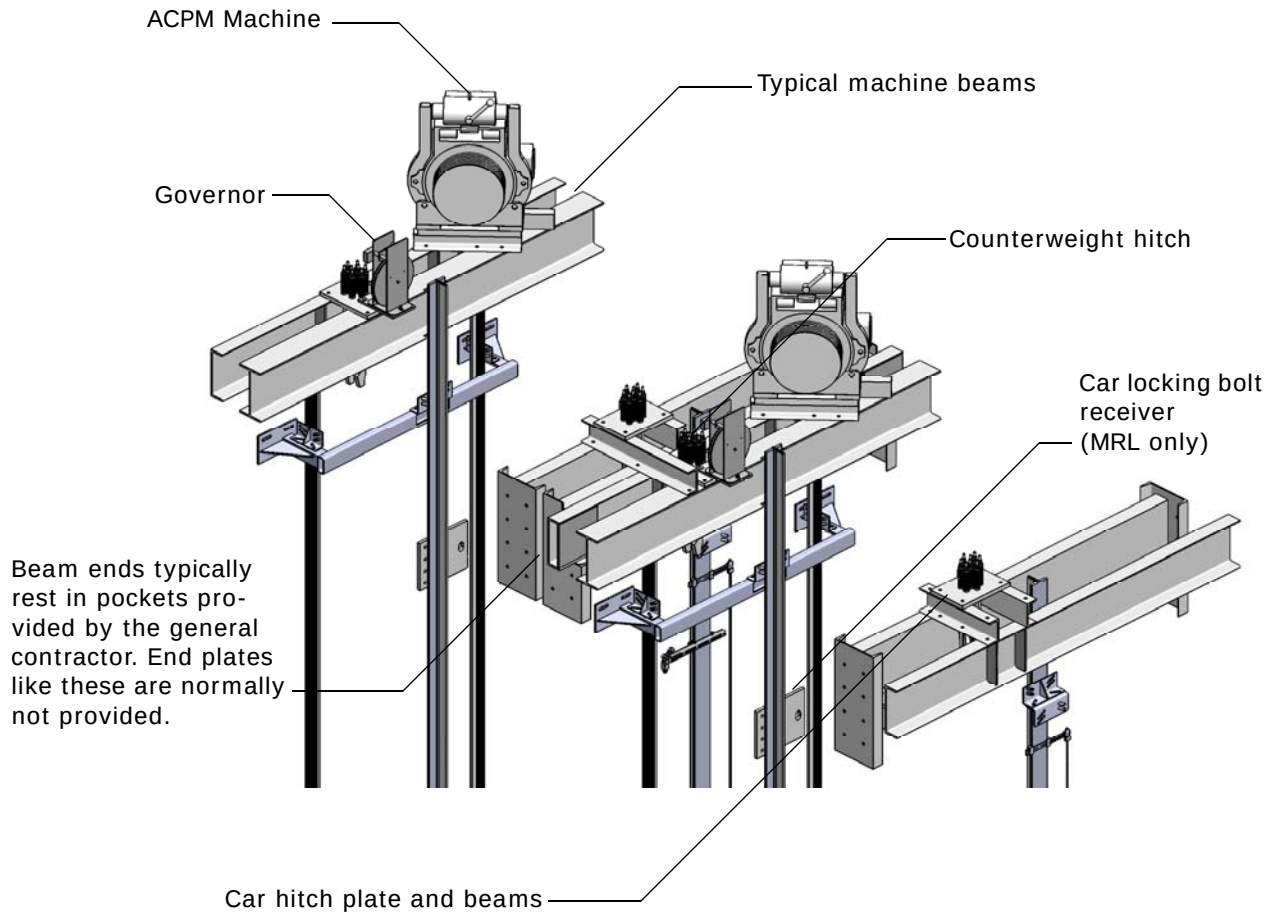
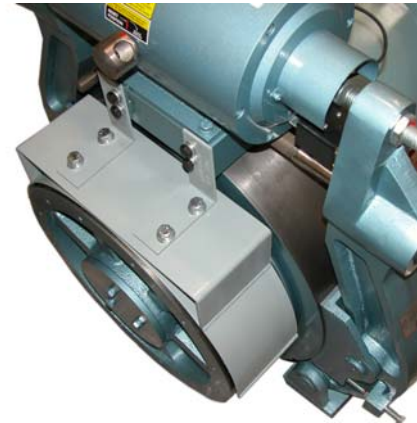


Figure 2.4 Typical 400 Series Imperial PMAC Gearless Machine



Depending on car weight and contract speeds, the machine for your job may be 400, 500, or 800 series.



Example of rope guard

478 Series Machine

If these guards are in place on your machine, remove them before installing the rope guard like the one shown above.

MRL Machine Bearing and Hitch Beams

The machine bearing beams must be properly supported per the reactions shown on the final MCE construction drawings. For MRL installations, do not grout the machine or hitch beams in place until after the machine is installed and you are satisfied with the plumb of the installation.

Hoisting Machines

Machinery eye bolts are provided for lifting hoist machines. Before lifting it is important to be certain that you are aware of proper hoisting procedures, correct eye bolt alignment, and correct hoisting equipment for best practice.

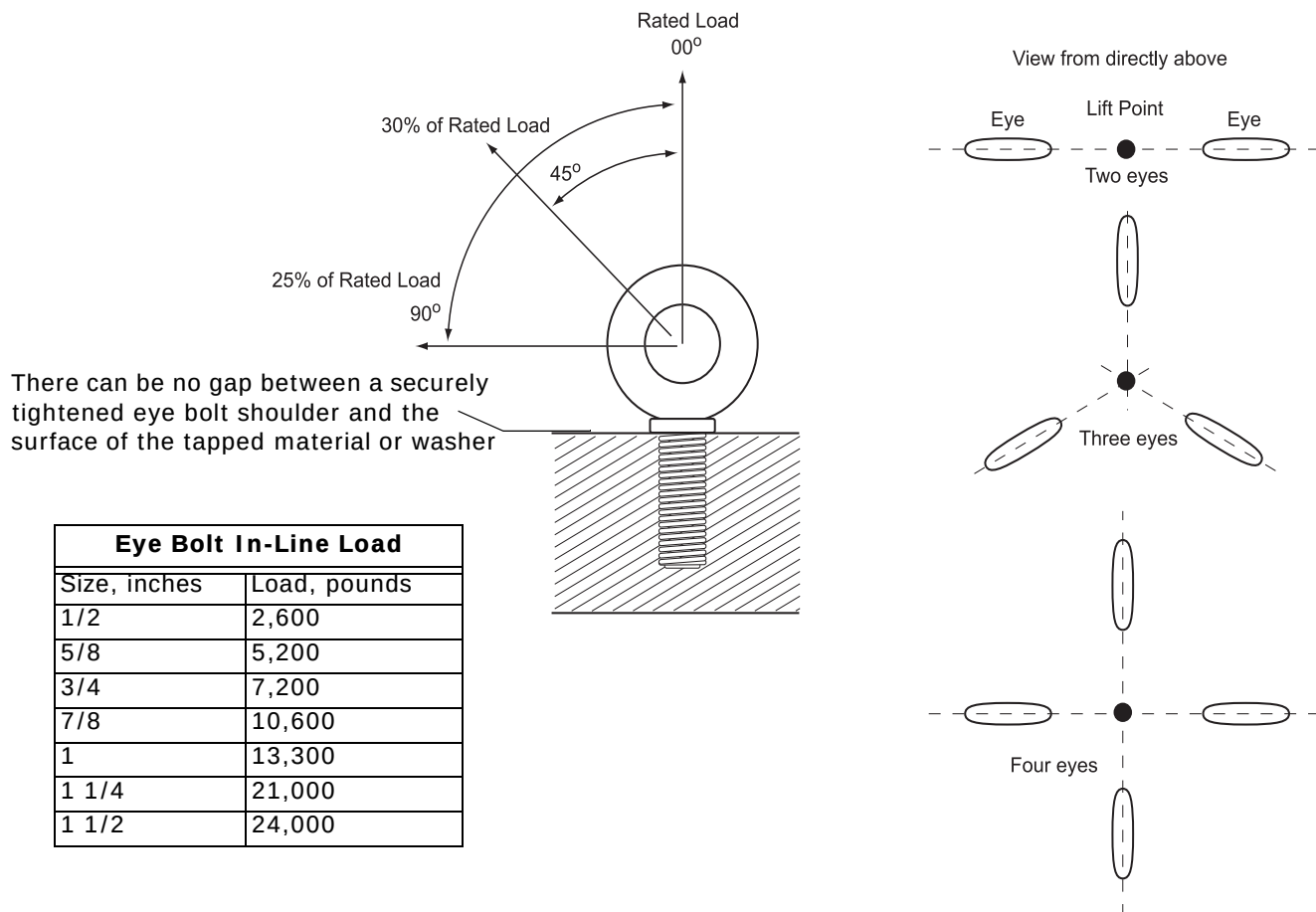
- Inspect eye bolts and lifting equipment carefully.
- Never use a damaged or worn eye bolt.
- Never use a bent or elongated eye bolt.
- Never machine, grind, or cut an eye bolt.
- Check that threads on shank and receiving holes are clean.
- Never exceed load limits for equipment or eye bolt size.



Caution

When lifting, if the force on an eye bolt is other than in-line (00°), the working load must be adjusted downwards. Additionally, the force must be aligned with the long cross section of the eye. See the following illustrations and tables.

Figure 2.5 Hoisting Eye Bolts



Aligning an Eye Bolt

If it is necessary to rotate an eye bolt for proper alignment with the hoisting force, you can place a shim of the correct thickness between the eye bolt shoulder and the tapped surface. The table below lists the shim thickness required to change eye bolt rotation 90° for various eye bolt diameters. Different rotation requirements can be extrapolated.

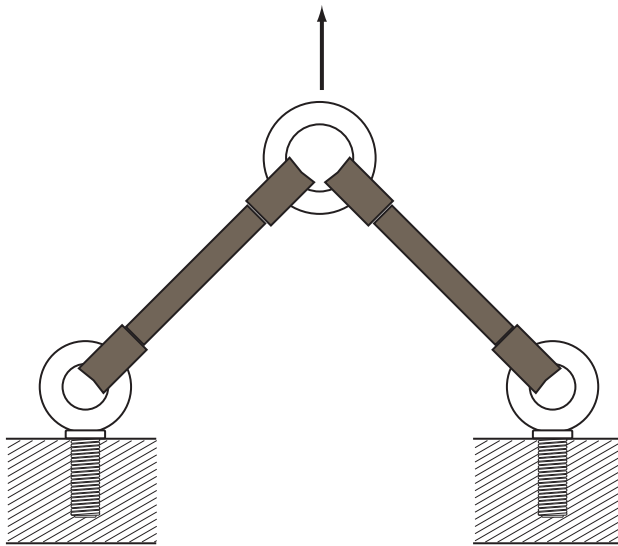
Table 2.1 Shimming to Rotate Eye Bolt Alignment

Bolt Size	Shim Thickness, inches
1/2	0.0192
5/8	0.0227
3/4	0.0250
7/8	0.0278
1	0.0312
1 1/4	0.0357
1 1/2	0.0417

Hoisting Equipment

Ensure that the hoist, ropes, tethers, and hardware are sufficient to hoist the machine weight with a good margin of safety.

Figure 2.6 Hoisting Equipment



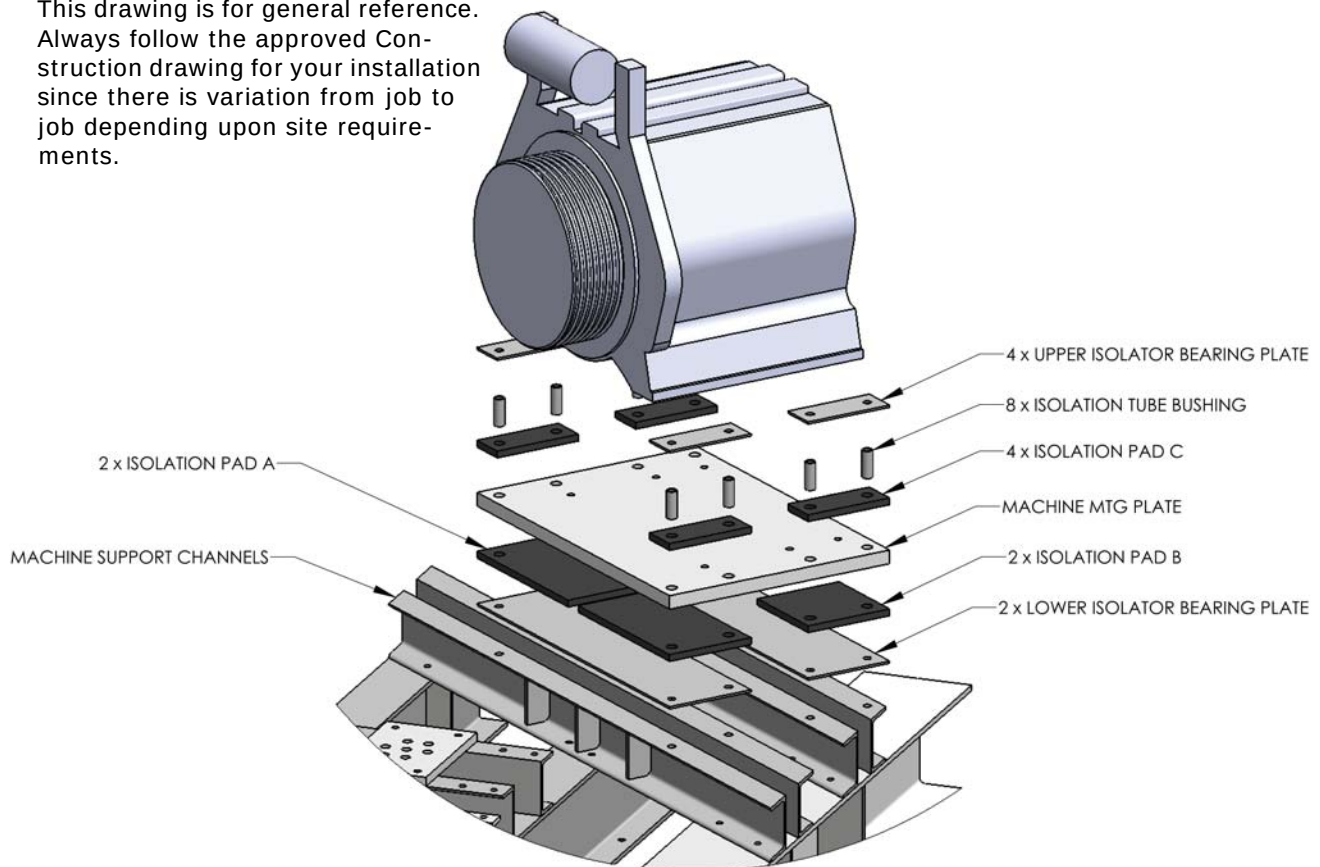
1. Use individual tethers for each eye bolt (or a tether assembly with centrally linked, individual tethers).
2. Stand clear of the load.
3. Lift with a steady, even pull — Do not jerk.

Machine Positioning

Machines are mounted on machine plates which in turn are mounted on plates on the machine beams. If required by the jurisdiction, special flexible isolators are provided for use between the machine plate and the machine beam plates.

Figure 2.7 Expanded View of Isolation Structure

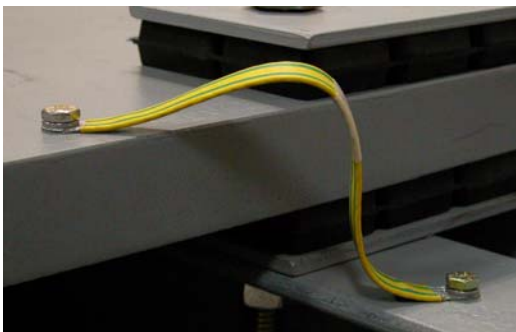
This drawing is for general reference. Always follow the approved Construction drawing for your installation since there is variation from job to job depending upon site requirements.



Bonding

The isolated machine and machine plate structure requires that a bonding strap be installed. This bonding strap has been factory installed and must be in place prior to applying power to the machine or brake (if removed for any reason).

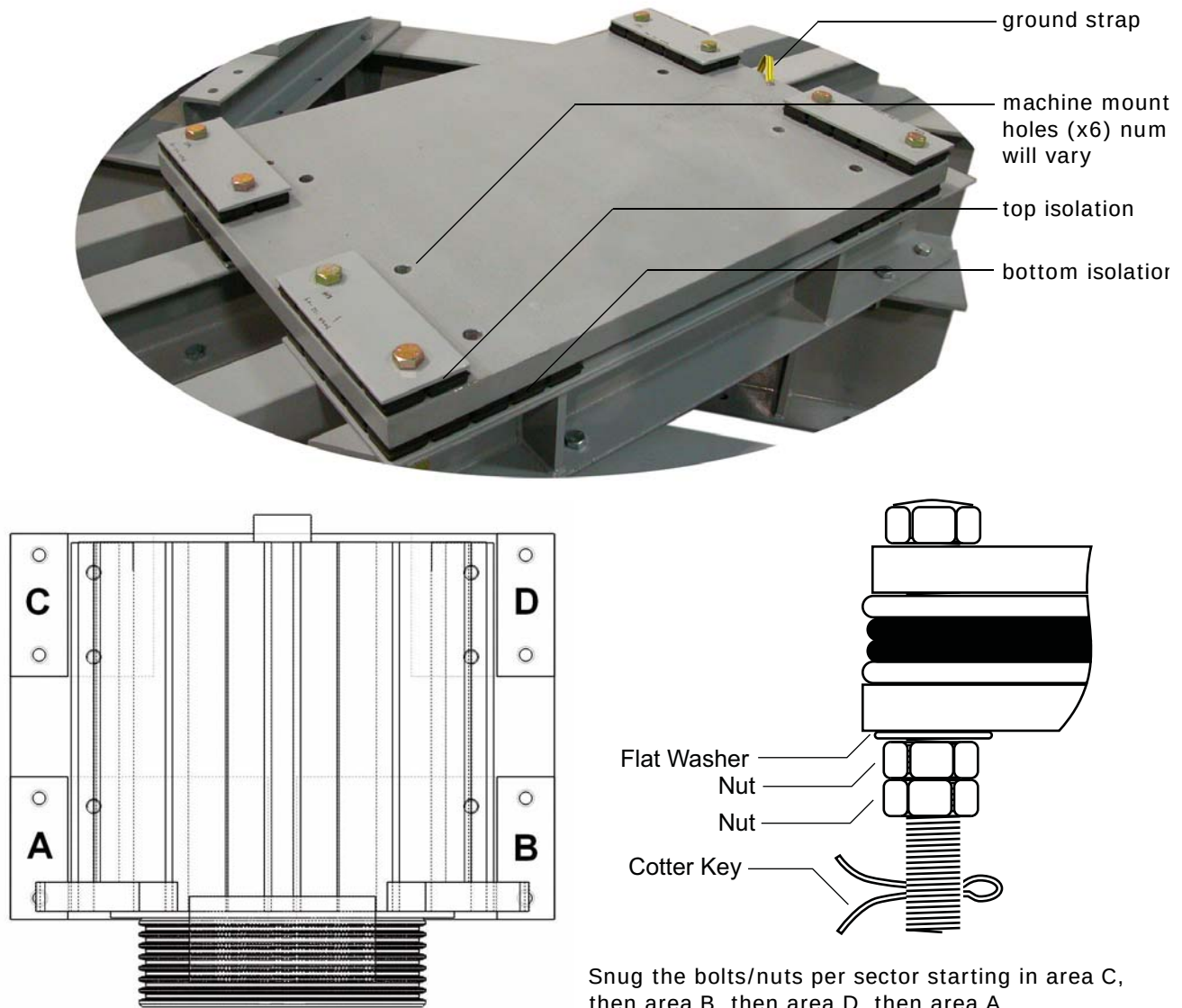
Figure 2.8 Bonding Strap



Hardware

As shipped from MCE, the machine plate and machine isolation pads are attached to the machine beams using Grade 8 bolts, flat washers, and standard double nuts. Once machine beam construction is complete and the machine is mounted, snug the first nut up against the flat washer; snug the second nut up to lock the first in place, and insert the provided cotter key through the hole in the bolt. Bend the cotter key ends to keep it in place.

Figure 2.9 Machine Plate Mounting with Isolation Pads and Grounding Strap



Snug the bolts/nuts per sector starting in area C, then area B, then area D, then area A.



Caution

IMPORTANT! After the cab and counterweight are complete and a full load is in the car, readjust the torque specification of the bolts in areas A and B to a torque specification of 50 lbf ft.

Isolation Pad Maintenance

- Monthly - Check machine isolation pads for abnormal wear, cracks, or displacement from the originally installed location. If any variation of isolation material is detected from the original installation, replace as necessary.

Important Information About PMAC Machines

Rotation of the AC current on the stator must be exactly synchronized to the rotation of the permanent magnet fields on the rotor. This is accomplished by an absolute position encoder on the machine. The encoder allows the drive to measure the exact positions of the magnets and align the stator field accordingly. [Please refer to “Static Learn using KEB/Torquemax Drive” on page 5-5.](#)

[Please refer to “Elevator Controller, Drive, and ISO Transformer” on page 3-52](#) and the elevator job prints for power cable connection information.

Machine Duty Labels

MCE provides a derating label for each machine shipped. For ACPM machines, the label is located on the power connection box.

Figure 2.10 Machine Derating Label (525 ACPM shown)



Lubrication and Maintenance

Machines require lubrication every 6 months or 3000 hours. 500 and 800 series machines have two lubrication points; 400 series machines have one.

- Specified lubricant: SKF LGEP2
- 475: sheave end bearing, 0.75 oz/21 g (478 1.0 oz/27 g)
- 522/525: sheave end, 1.75 oz/55 g - encoder end, 0.50 oz/15.3 g
- 805/808: sheave end, 1.75 oz/55 g - encoder end, 0.50 oz/15.3 g

Please refer to “Lubrication, 475/478, 522/525 ACPM Machines” on page 6-52.



Caution

Damage due to improper bearing lubrication is not covered by warranty. If incompatible lubricants are mixed, lubricant consistency will change and bearing damage due to hardening or leakage can result. If you have a question, contact Imperial Electric Company at 330 734 3600 or an MCE representative at 916 463 9200.

Hitch Plates (Dead End)

The dead end hitch plate for the car is generally secured to a car hitch beam opposite the machine beams in the hoistway overhead. The dead end hitch plate for the counterweight is generally secured to the machine beams. Refer to the overhead drawings. Also see [Typical MRL Overhead Layout on page 2-4](#).

Rail Installation

This section describes installing the car and counterweight rails and associated components.

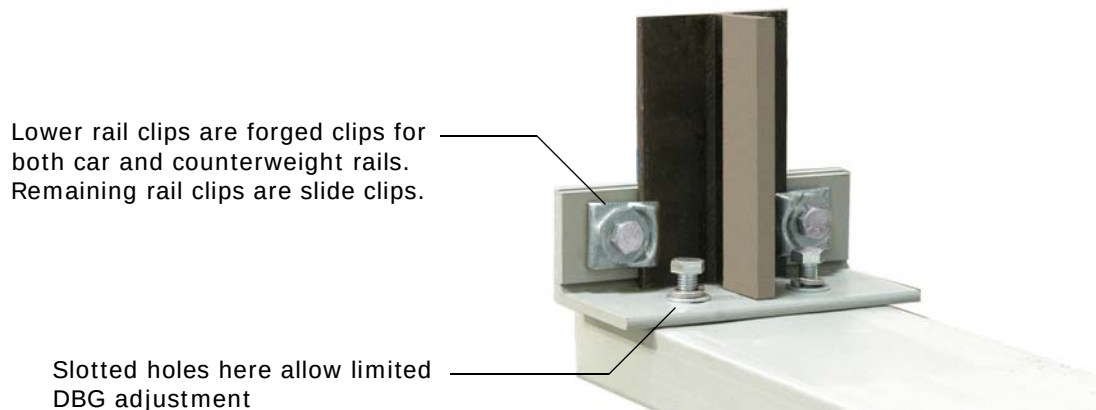
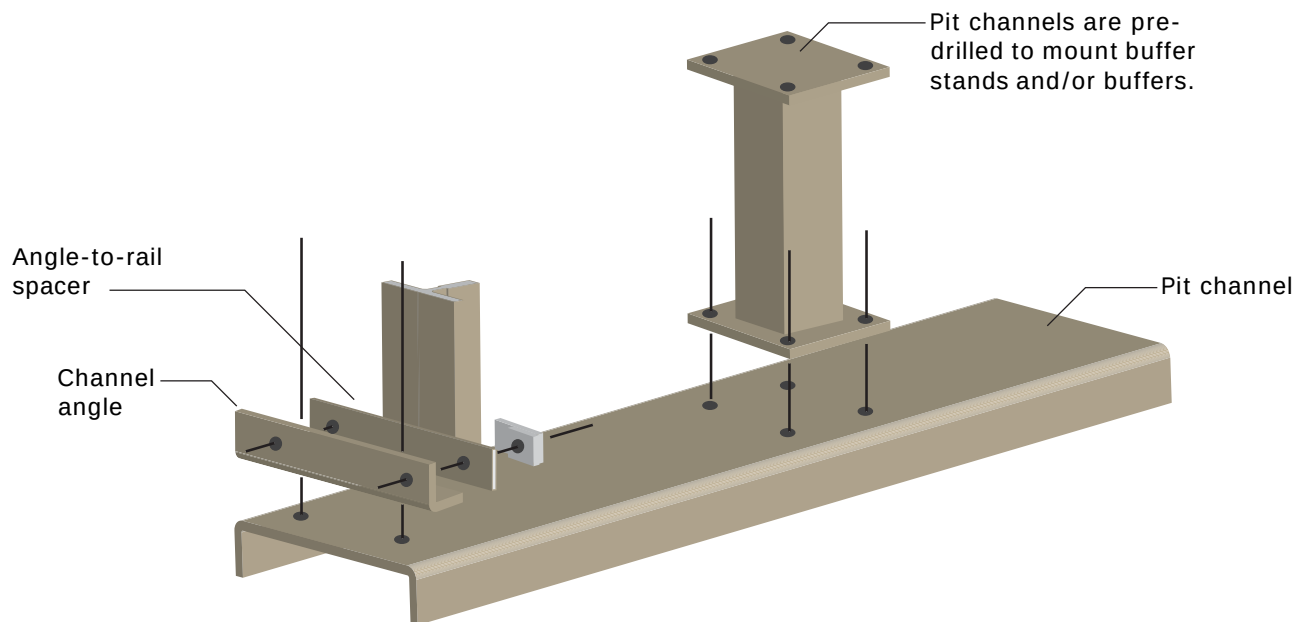
Materials

Materials needed to install car and counterweight rails are:

- Car Pit Channel
- Counterweight Pit Channel
- Channel angles
- Angle-to-rail spacers
- Hardware

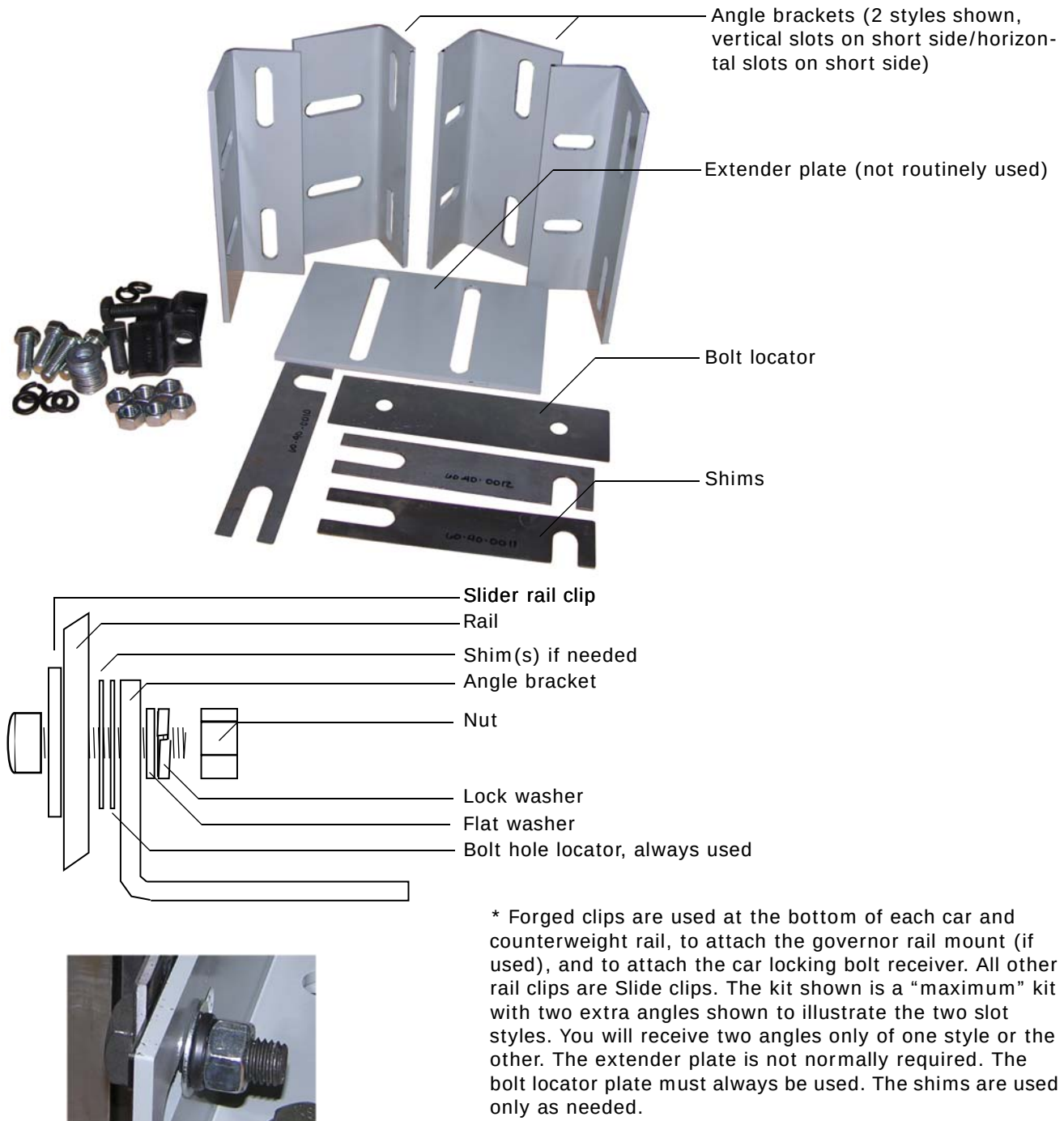
Pit channels support the buffers and first rail lengths.

Figure 2.11 Buffer Channel



- Rail Brackets and Adjust Plates
- Rail Clips

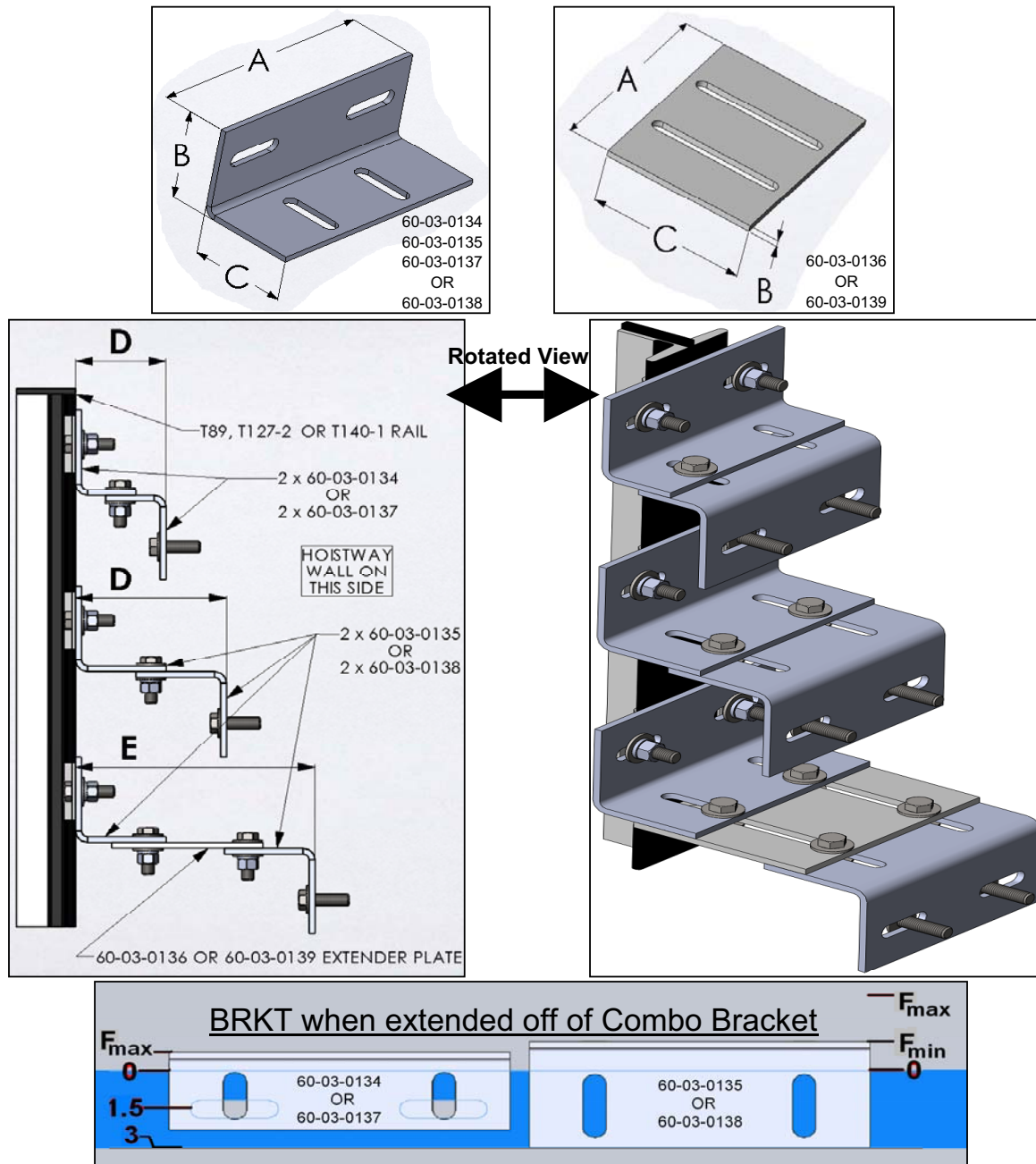
Figure 2.12 Rail Attaching Hardware



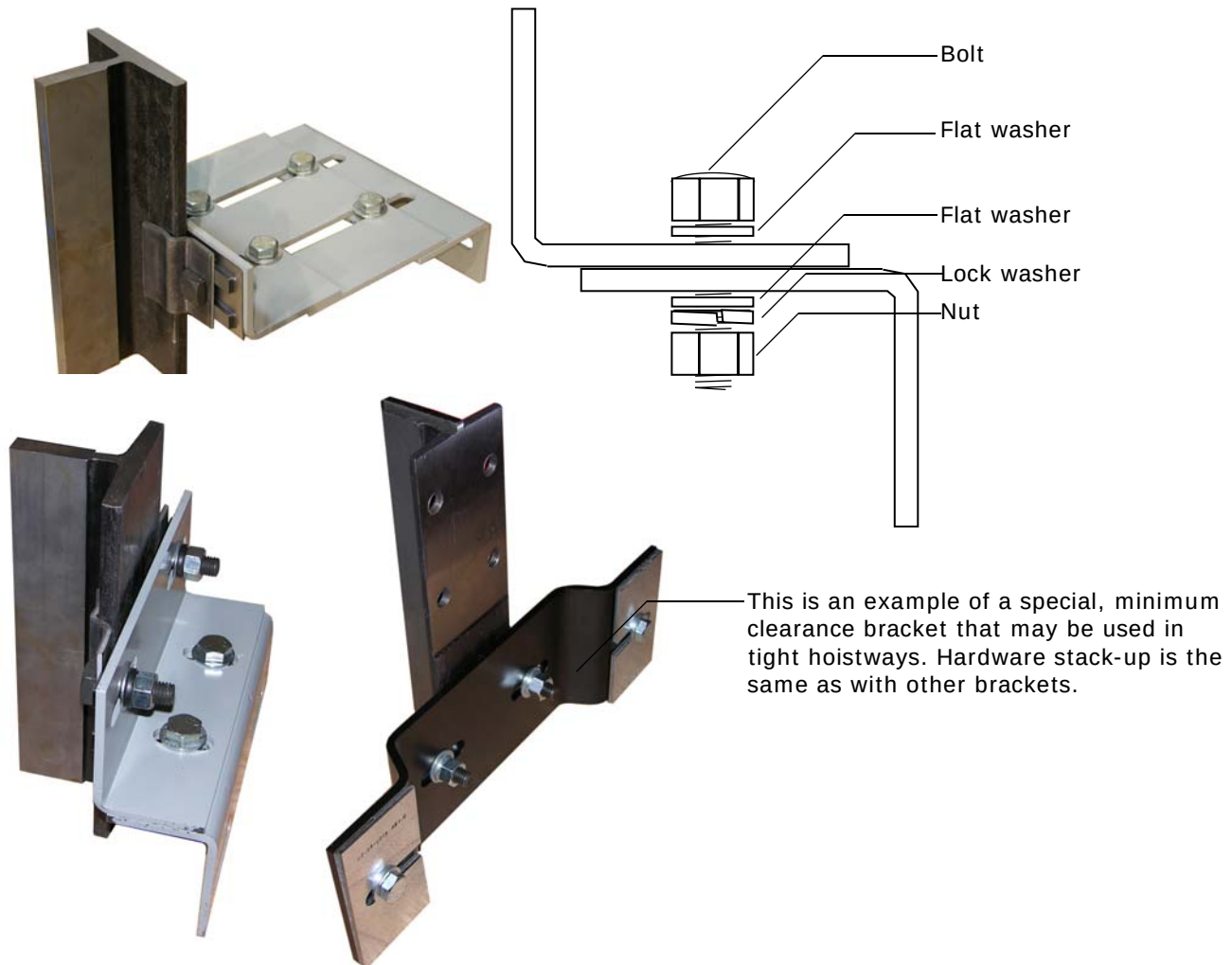
General Rules for Rail Clips

- Slide clips are used with brackets that are attached to the building.
- Forged clips are used with brackets that are not attached to the building.
- Forged clips are used to attach rails to pit channels.

Figure 2.13 Rail Bracket Details



RAIL BRACKETS							
GUIDE RAIL SIZE	PART #	DIMENSIONS (inches)					
		A	B	C	D	E	Fmin to Fmax
T89	60-03-0134	8	3.75	2.5	2.5 to 3.75	N/A	0 to 0.375
T89	60-03-0135	8	3.75	3.75	3.75 to 6.25	6.25 to 11.375	0.75 to 1.625
T127-2 & T140-1	60-03-0137	10.5	4.25	3	3 to 4.5	N/A	0 to 0.75
T127-2 & T140-1	60-03-0138	10.5	4.25	4.25	4.25 to 7	6.75 to 12.25	1.25 to 2.0
T89	60-03-0136	8	0.25	6.25	N/A	N/A	N/A
T127-2 & T140-1	60-03-0139	10.5	0.25	6.75	N/A	N/A	N/A

Figure 2.14 Rail Bracket Examples

Table 2.2 Rail Bracket Shim

Description	Part Number
T89 Rail Bracket Shim 30GA	60-04-0030
T89 Rail Bracket Shim 20GA	60-04-0031
T89 Rail Bracket Shim 16GA	60-04-0032
T89 Rail Bracket Shim 12GA	60-04-0033
T127 & T140-1 Rail Bracket Shim 30GA	60-04-0034
T127 & T140-1 Rail Bracket Shim 20GA	60-04-0035
T127 & T140-1 Rail Bracket Shim 16GA	60-04-0036
T127 & T140-1 Rail Bracket Shim 12GA	60-04-0037
T140-2 Rail Bracket Shim 30GA	60-04-0038
T140-2 Rail Bracket Shim 20GA	60-04-0039
T140-2 Rail Bracket Shim 16GA	60-04-0040
T140-2 Rail Bracket Shim 12GA	60-04-0041

- Car Rails
- Fish (rail joining) Plates

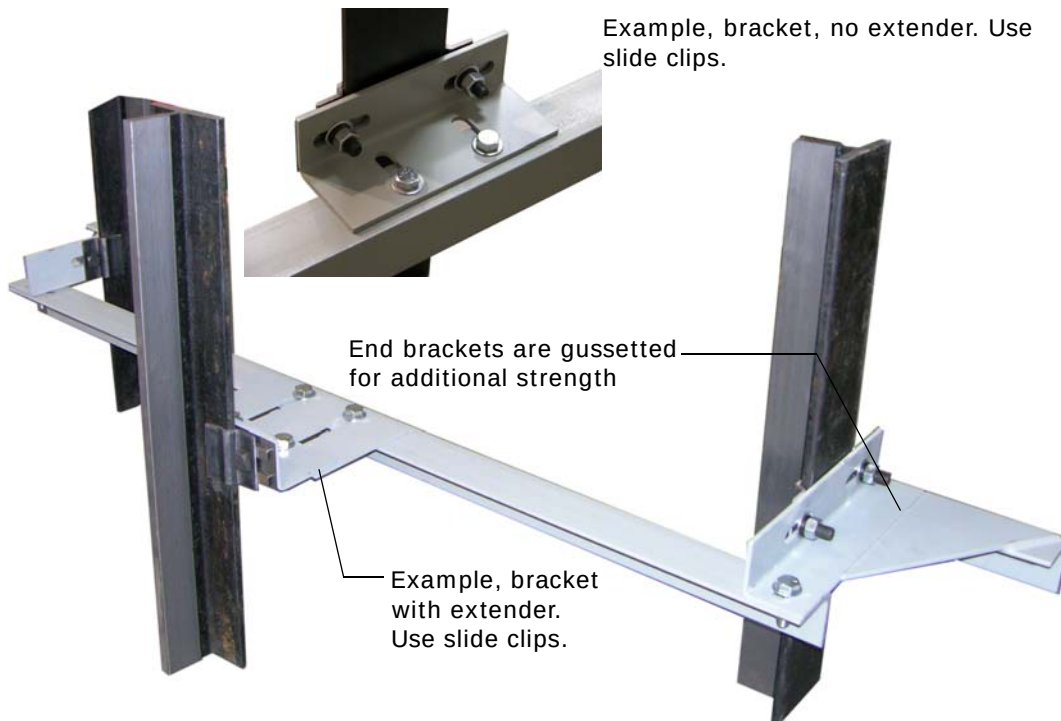
Figure 2.15 Fish Plate and Rail Section



- Counterweight Rail Guides/Brackets
- Counterweight Rails
- Counterweight Rail Clips

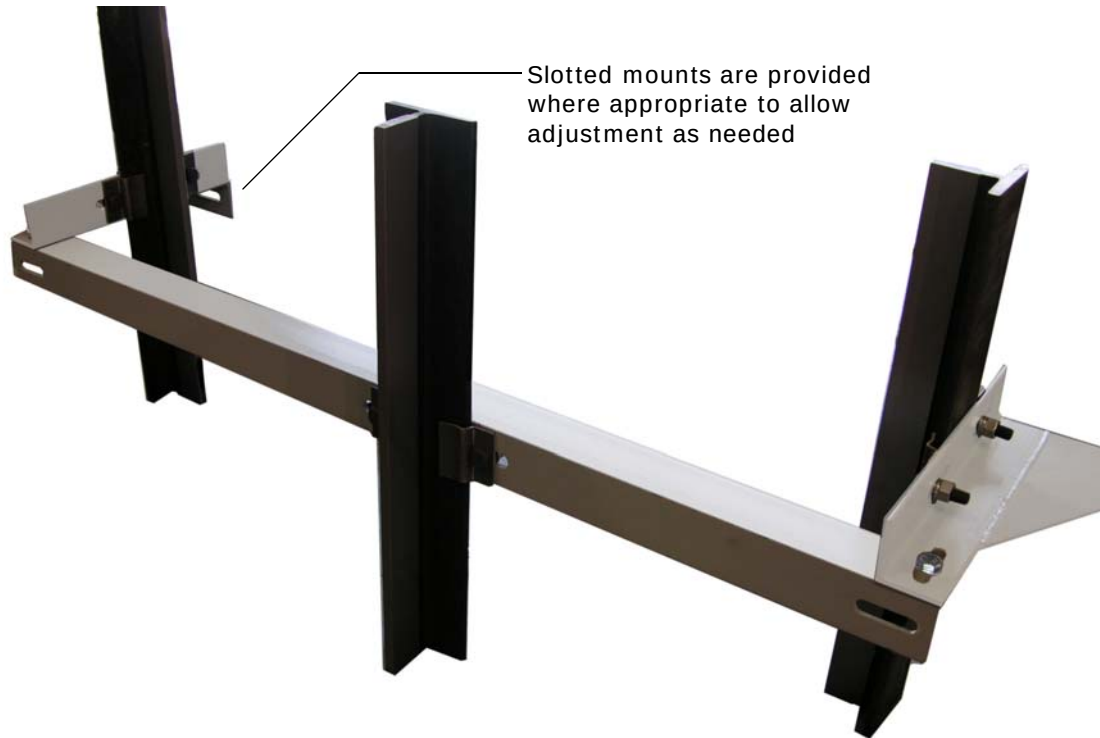
Brackets are provided for the counterweight rails. The brackets “cage” the counterweight, defining its location in the pit and hoistway and providing mounting points for the counterweight rails. They are called “combination” brackets because one of the car rails mounts to the outside of the bracket.

Figure 2.16 Counterweight Rails Guides - Combination Brackets



Depending upon job clearances, rail brackets may be used with the combination brackets or the rails may be clipped directly to the combination brackets. Refer to your job drawings.

Figure 2.17 Rail Attachment to Combination Brackets



Rail brackets may be used as above



Or, the front piece of the combination bracket may be rotated and the rail attached directly

Forged clips are used with the pit channels while slide clips are used in all remaining positions

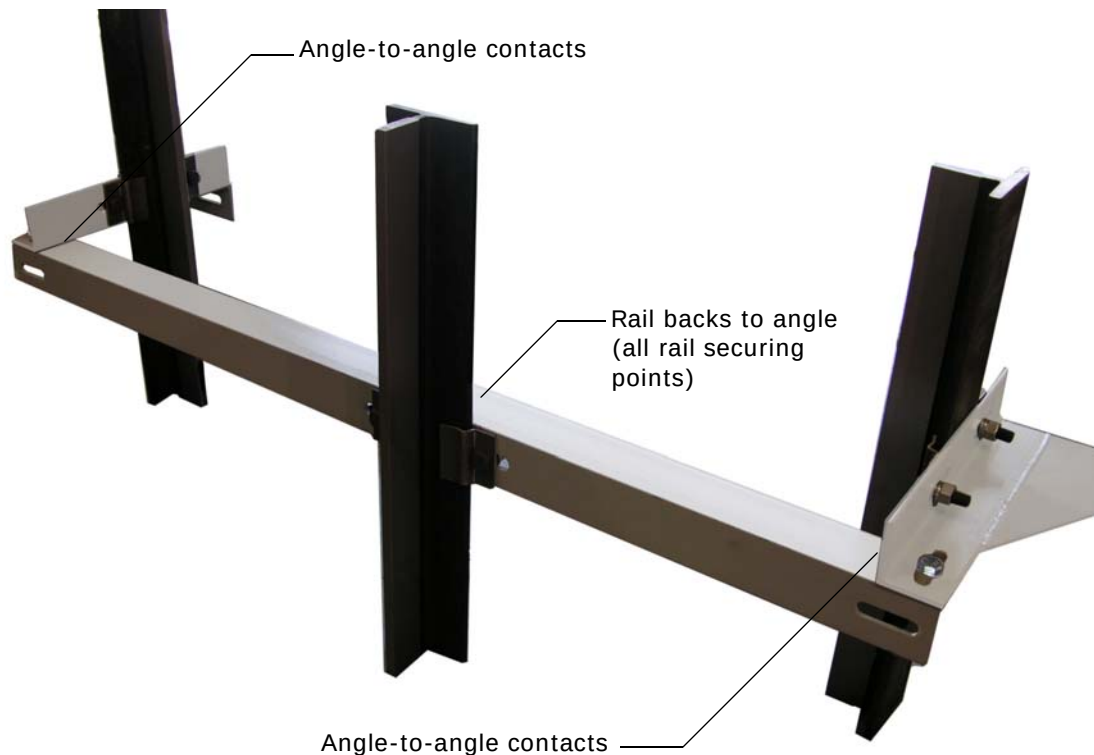
Layout

- Refer to the job layout drawings.
- Verify that pit dimensions are as shown.
- Verify that pit walls are plumb from top to bottom.
- Verify that any grouted-in work is as specified.
- Verify that pockets for machine and other bed plates are as specified.
- Verify that hoisting support beams are in place and adequate to the job.
- Verify that hoistway lighting and electrical are present and as specified.
- Check pit floor is level and in good condition.

Welds

Once installation and final adjustment are complete, we advise an appropriately certified welder to additionally secure combination bracket adjustment points against any potential loosening or movement.

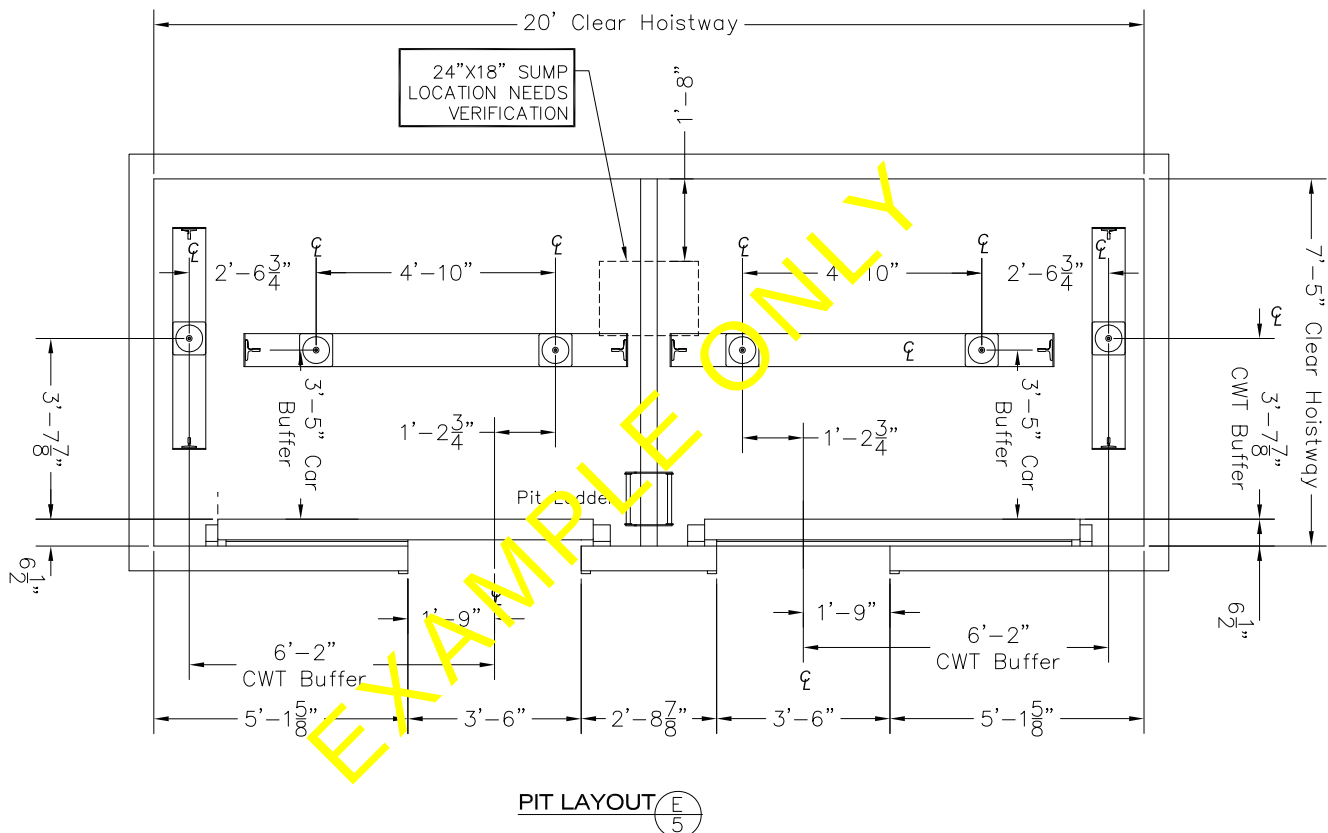
Figure 2.18 Recommended Rail Hardware Weld Points



Car and Counterweight Pit Channels

Pit channels are provided for the car and for the counterweight. The channels install on the pit floor and provide buffer and guide rail support. Refer to the layout drawing in the Construction Drawings package. A sample layout drawing for a two car installation is shown below.

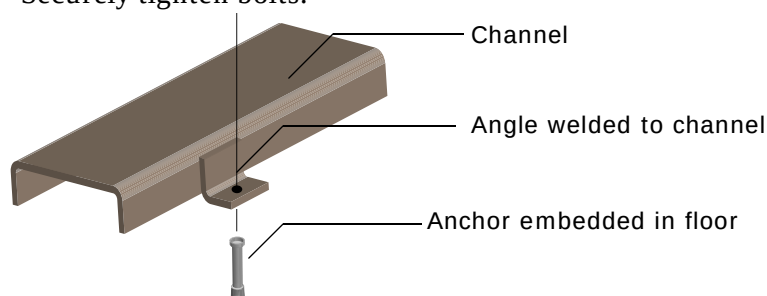
Figure 2.19 Sample Pit Layout



Channel Hold-Downs

The channel kit may include heavy-duty angles to further secure car and counterweight channels in place. If so, or if you determine additional anchoring is required:

1. Determine the best angle locations.
2. Mark and drill anchor holes. Set floor anchors. Lightly secure angles to anchors with bolt and locking washer.
3. Weld angles to channel. (Welds must be by an AWS certified welder.)
4. Securely tighten bolts.



Counterweight Rails

Counterweight rails mount on the inside of the combination brackets as shown in the final construction drawings. Place short rails (if used) as shown in the elevation drawing.

1. Carefully plumb and set the combination brackets.
2. Adjust the placement of the counterweight pit channel.
3. Install the rails in the usual fashion using forged clips at the pit channel and slide clips at other locations.
4. Align and tram.
5. Dress and clean as needed for smooth counterweight travel.

Car Rails

The standard rail sections provided are 16 feet long. Per job, starting or finishing rail lengths may be shorter. The elevation drawing will show where any short lengths are to be placed for the job.

1. Install all rails “tongue up.”
2. Install brackets and rails in the usual fashion. 5/8-inch bolts, flat and lock washers are provided along with the slide clips, spacer/hole locators, and shims.
3. Use forged clips at the pit channel location. Use slide clips for additional rail sections.



Note

Depending upon available clearance, rail angles may be turned (short rather than long end to adjusting plate), or the adjusting plate may be omitted. Always use the spacer/hole locator between the rail back and the angle bracket. Shims are provided for fine adjustment. [Please refer to “Rail Attaching Hardware” on page 2-13.](#)

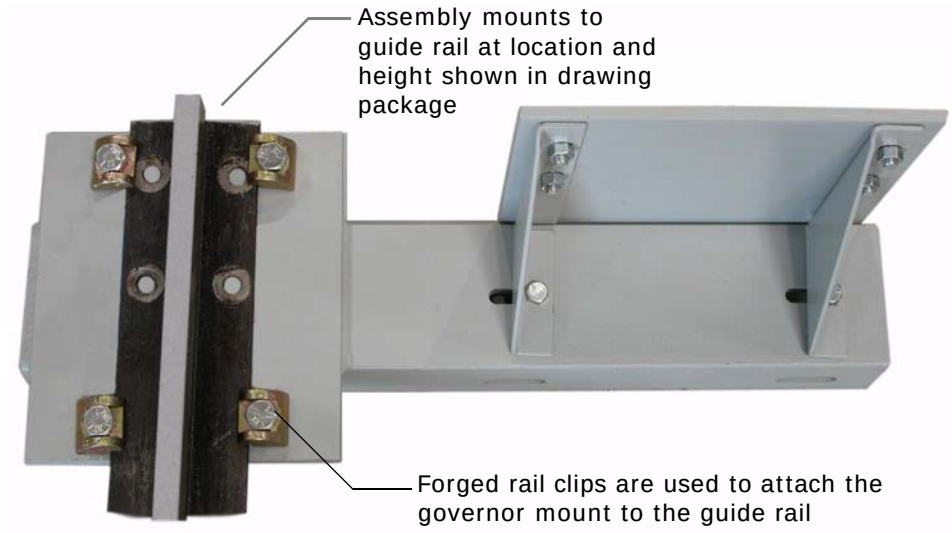
4. Check that the finished rail installation provides the correct DBG and is plumb, parallel, and perpendicular. Dress rail guide faces if required.
5. If needed, clean rails to ensure they are free of dirt, rust, paint, or grease.

Governor Mounting

With the standard MRL or overhead machine room installation, the governor is mounted on the machine beams. Refer to MCE construction drawings for the installation.

If site conditions do not allow this, the governor mounting assembly shown below or an appropriate alternate is used.

Figure 2.20 Alternate Governor Mounting Assembly





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Platform and Hoistway

In this section

This section describes car assembly and hoistway mechanical work, including:

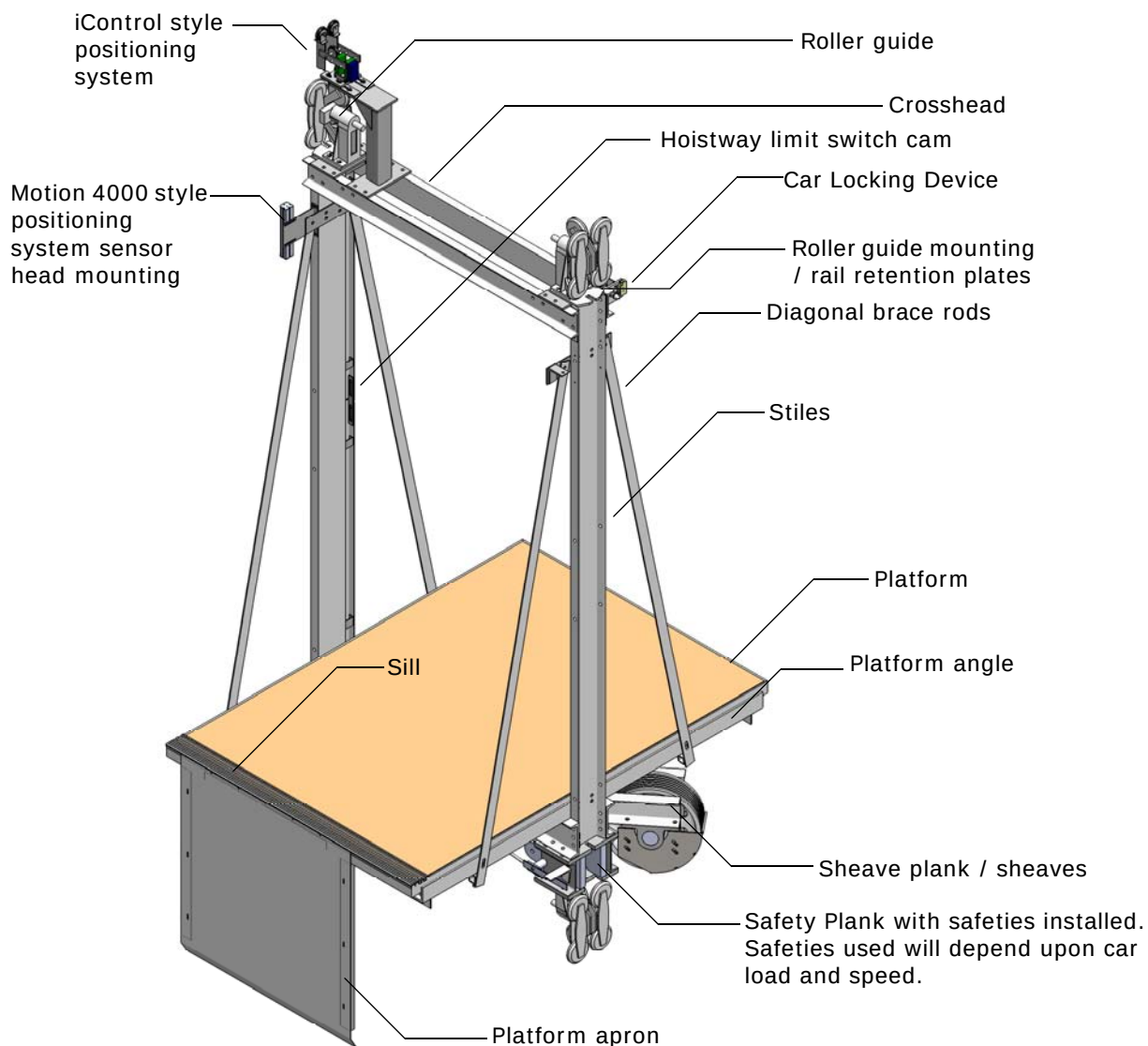
- Sling/platform Assembly [3-2 ->](#)
- Counterweight Installation [3-12 ->](#)
- Car Buffers [3-22 ->](#)
- Car Roller Guide Installation [3-24 ->](#)
- Hoist Ropes [3-26 ->](#)
- Governor Installation [3-33 ->](#)
- Safety Adjustment [3-41 ->](#)
- Temporary Run Box [3-44 ->](#)
- Traveler and Hoistway Cables [3-45 ->](#)
- Compensation [3-48 ->](#)
- Balancing the car [3-49 ->](#)
- Car Top Locking Bolt [3-50 ->](#)
- Controller and Isolation Transformer [3-52 ->](#)

Sling / Platform Assembly

Materials needed to assemble the car frame and platform are:

- Safety plank/sheave beam assembly
- Platform
- Stiles
- Crosshead
- Brace Rods
- Switch Operating Cam
- Hardware

Figure 3.1 Typical Sling / Platform Components



Safety Plank / Sheave Plank Assembly

MCE provides a base assembly consisting of the car safety plank with safeties installed and the car sheave beam, with sheaves and guards installed.

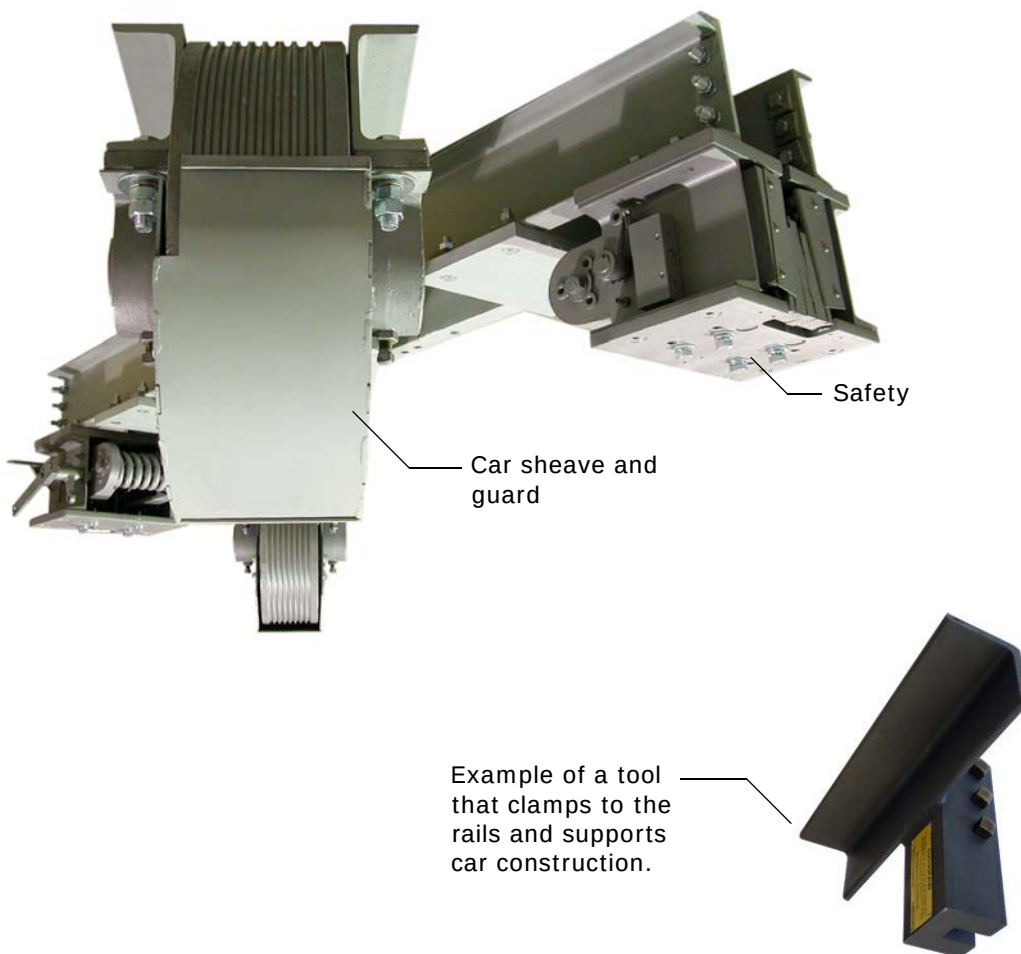


Danger

Working with unroped platform components is extremely dangerous. You must ensure that all components are safely and adequately supported during construction. Support failure or collapse can result in extreme injury or death.

1. Using blocking tools similar to Wurtec car builders, set up to position the safety plank/sheave plank assembly between the guide rails.
2. Use a hoist to lift the base assembly into place on the blocking tools or supporting structure.

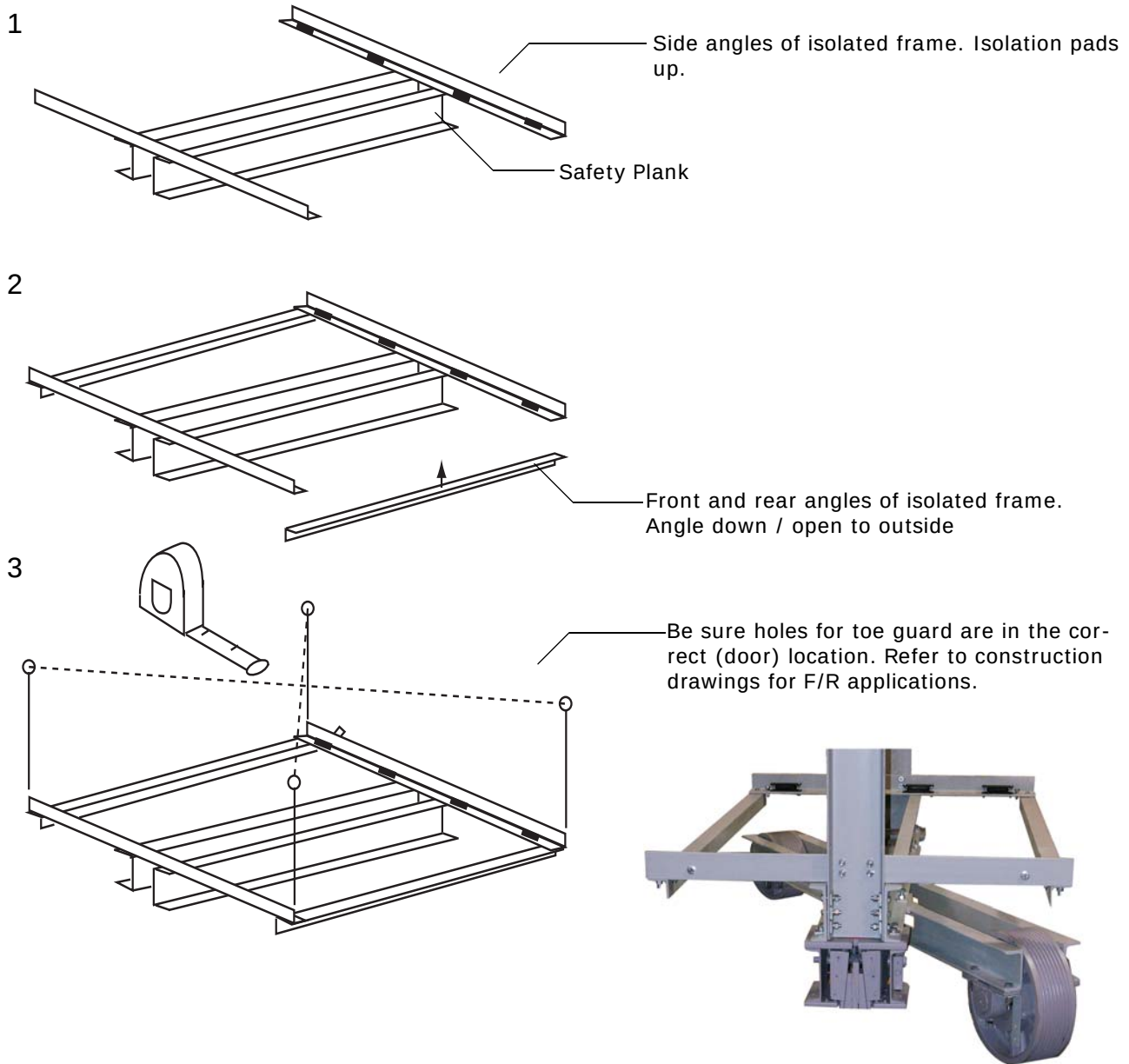
Figure 3.2 MCE Base Assembly with Safeties and Sheaves



Sling / Platform Assembly

1. First attach the two side platform angles to each end of the safety plank. Isolation pads up; open face in. Tighten lightly.
2. Next, attach front and rear platform angles to the bottoms of the side angles (angles down and open face away from the safety plank). Tighten lightly.
3. Check square of the platform frame by measuring diagonally from corner to corner. Both measurements should be the same. Tighten securing bolts.

Figure 3.3 Platform Assembly



Stiles and Crosshead

1. Place stile between platform safety plank C-channels, base resting on top of safety, open face out.
2. Bolt through safety C-Channels and platform angles as shown. Tighten lightly.

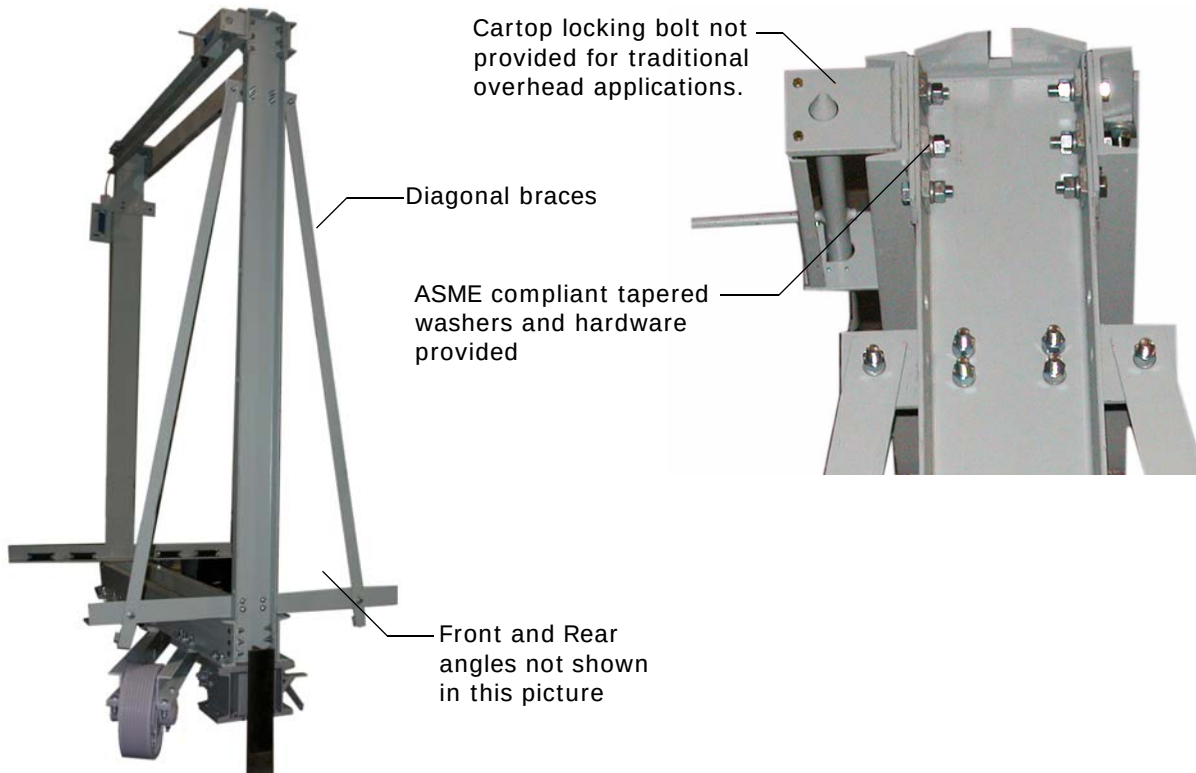
Figure 3.4 Stile Lower Attachments



ASME compliant tapered washers (provided)

3. Install diagonal braces. Attach first to stile, then to platform angle. Tighten lightly.
4. Install crosshead using ASME compliant tapered washers and hardware provided.

Figure 3.5 Diagonal Braces



Cartop locking bolt not provided for traditional overhead applications.

Diagonal braces

ASME compliant tapered washers and hardware provided

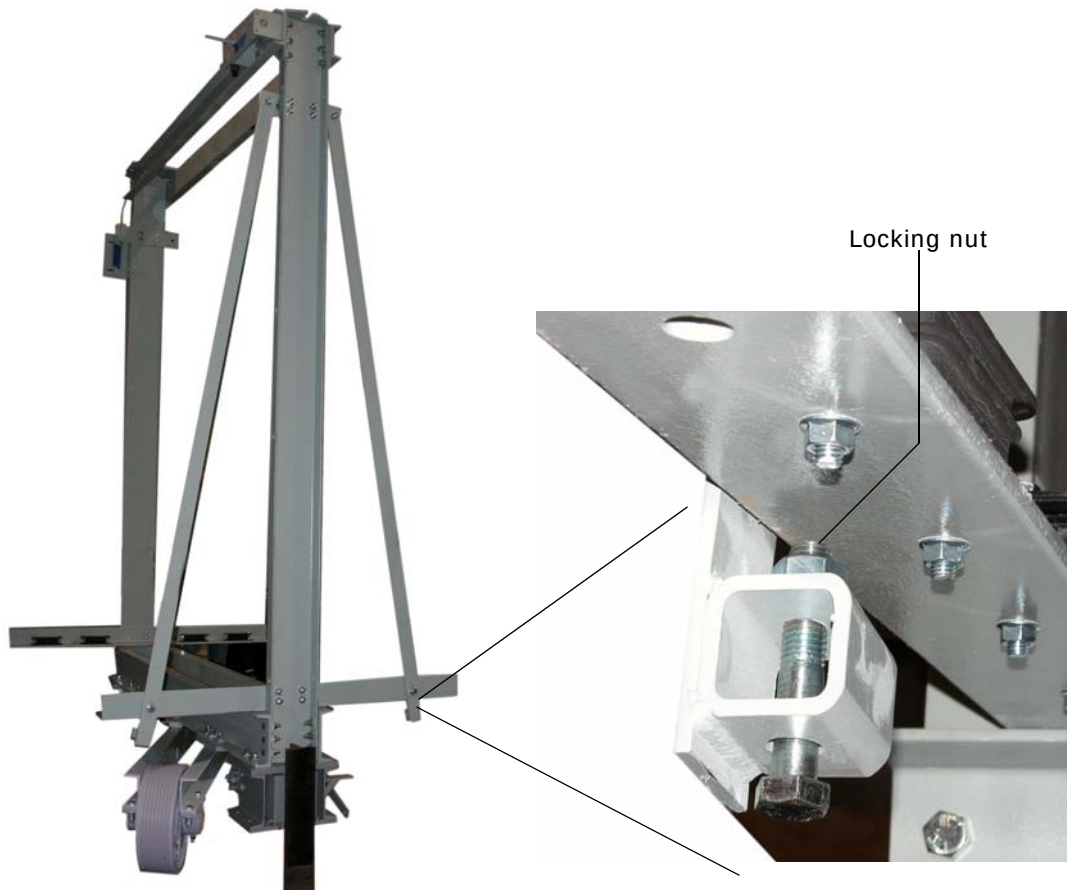
Front and Rear angles not shown in this picture

Braces and Platform Leveling

Diagonal braces are used to properly torque and adjust the platform-to stile-geometry so that everything is plumb and square and level. The braces provide rigidity and form to the sling structure. Please refer to “Typical Sling/Platform Components” on page 3-2.

1. Insert level-adjusting bolts and locking nuts through the box tubing at the bottom of each diagonal brace to the point of just touching the underside of the platform.
2. Adjust the bolts as required to square the platform with the true-plumb stiles.

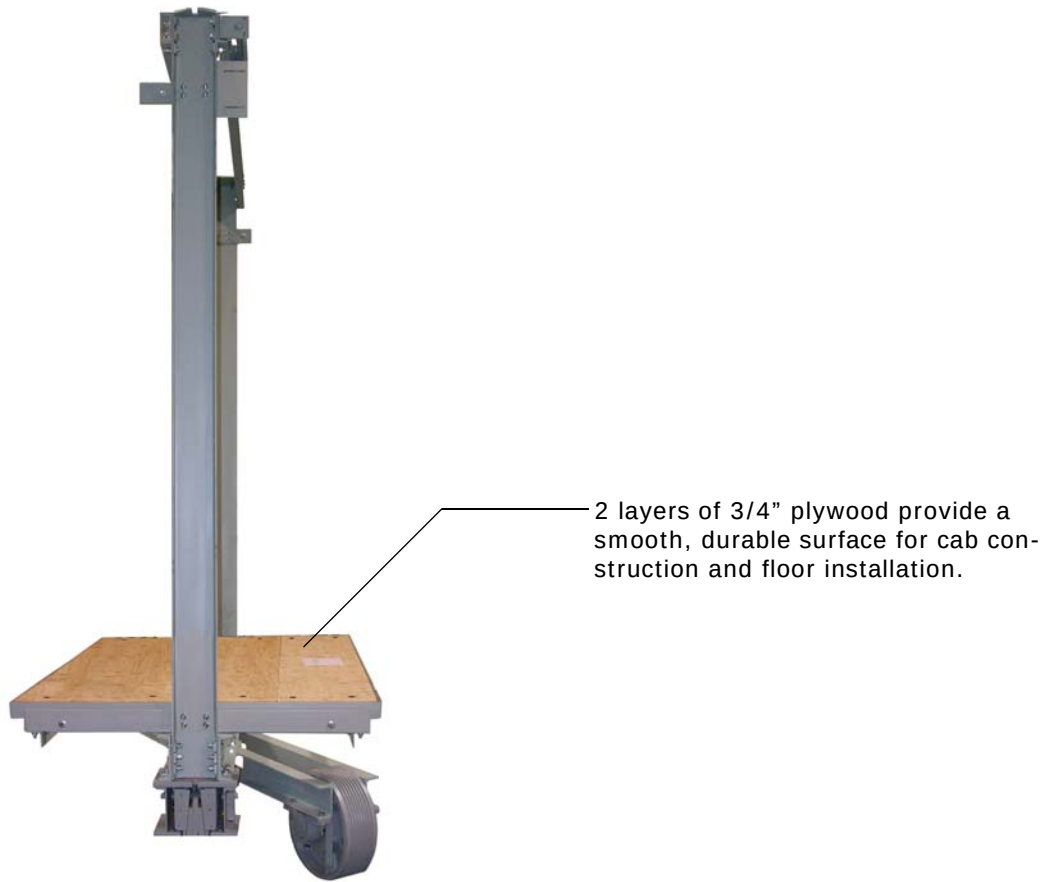
Figure 3.6 Stile Braces



3. Check parallel, square, level, and plumb aspects of the sling assembly:
 - Safety plank/stiles
 - Platform angles/stiles
 - Brace rods/stiles
 - Crosshead/stiles
 - Brace rods/platform angles
4. Check that tapered washers are properly used where required to ensure through-bolts are square. Tighten securing bolts.
5. Tighten locking nuts on adjusting bolts down to the face of the box tubing so that the adjusting bolts cannot move over time.

6. Set platform assembly onto isolation pads, noting correct location of tapped holes for car apron (on bottom). Refer to MCE construction drawings and ensure the platform is correctly oriented.
7. Secure platform to isolation pads using hardware provided.

Figure 3.7 Platform Surface Install



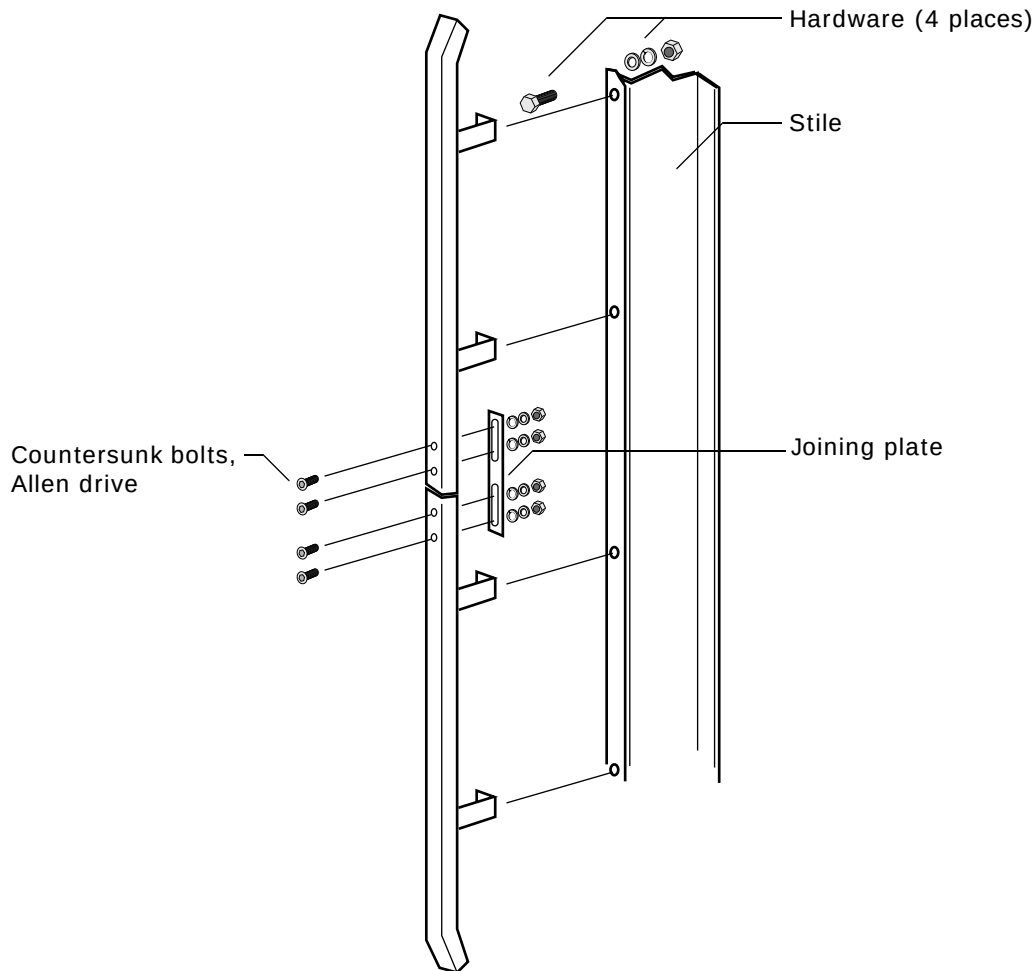
Note

Referring to the illustration above, for standard jobs, two layers of 3/4" plywood will have been installed on the platform at the factory. If the cab is provided by MCE, the car sill will have been attached at the factory as well. If a customer provided cab is used, the sill must be installed in the field in accordance with the cab drawings and with MCE construction drawings.

Limit Switch Operating Cam

The hoistway switch operating cam is provided in two sections. A joining piece with slotted bolt holes joins the two for increased rigidity and strength. The cam is attached to one of the car stiles in the location shown in the final construction drawings for the job.

Figure 3.8 Hoistway Switch Operating Cam



Hoistway Switch Controller Dependency

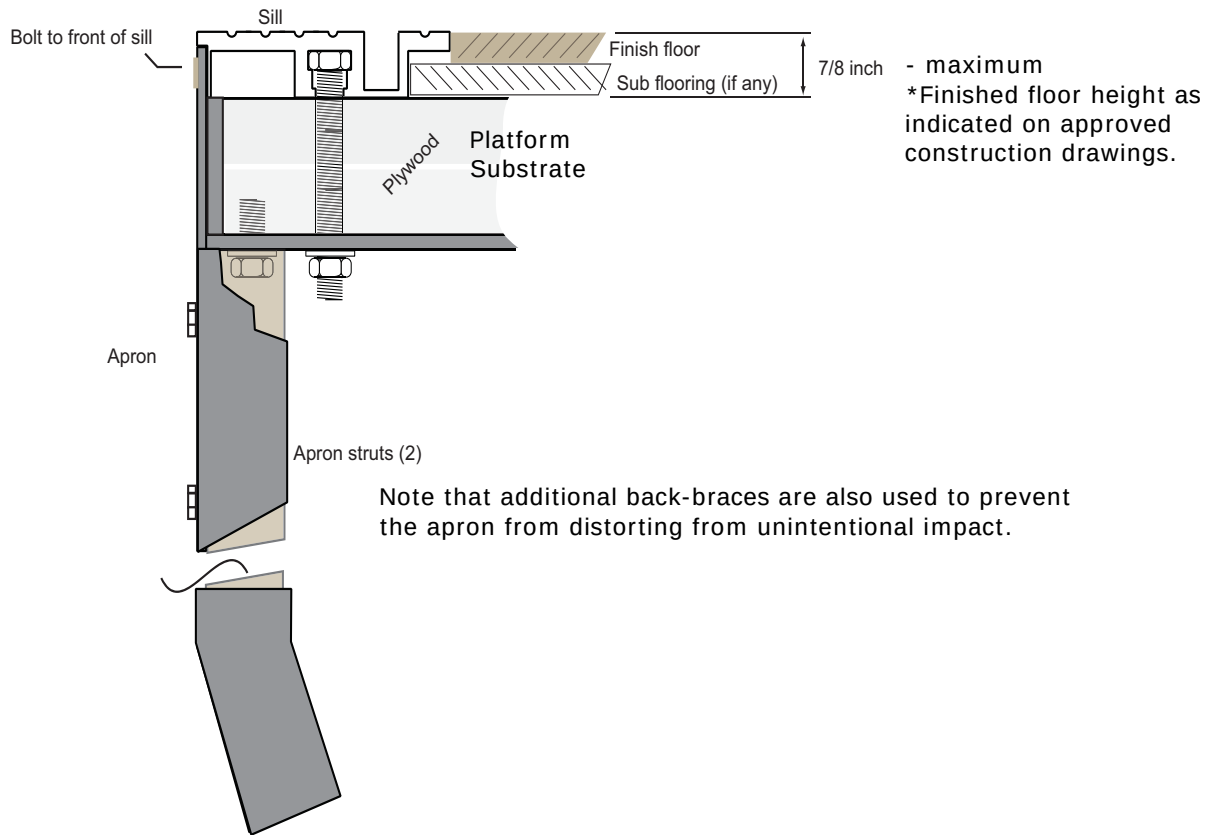
You may receive either a Motion 4000 controller or an iControl controller, depending on job requirements. Hoistway switch arrangements for the two are different:

- Motion 4000: Typically, only two mechanical limits (Final Limit Switches) are installed. Other switches (Terminal Slowdowns, etc.) are “virtual” switches, placed in software and referenced to the positioning system tape.
- iControl: With iControl, an MCE TLS-C cartop-mounted limit switch system is provided along with two mechanical final limit switches.

In all cases, refer to MCE Controller drawings (job prints) for limit switch information.

Car Sill, Apron, and Flooring

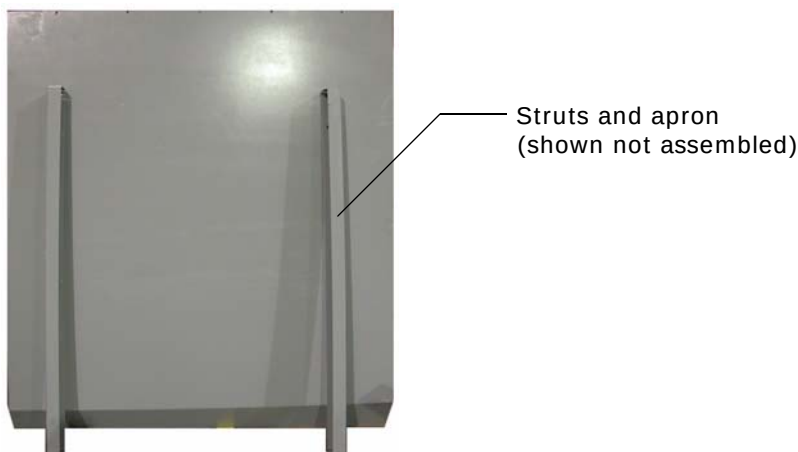
Figure 3.9 Car Sill, Apron, and Flooring Installation Detail



The apron is typically attached with bolts and nuts to the front of the struts that in turn bolt to tapped holes in the platform frame. Nickel silver sills will mount differently due to extrusion differences. See your final construction drawings.

1. Attach the struts for the toe guard. Attach them with the open sides facing one another. Attach the toe guard across the outer face of the struts (bolts into the strut fronts, nuts inside the struts).

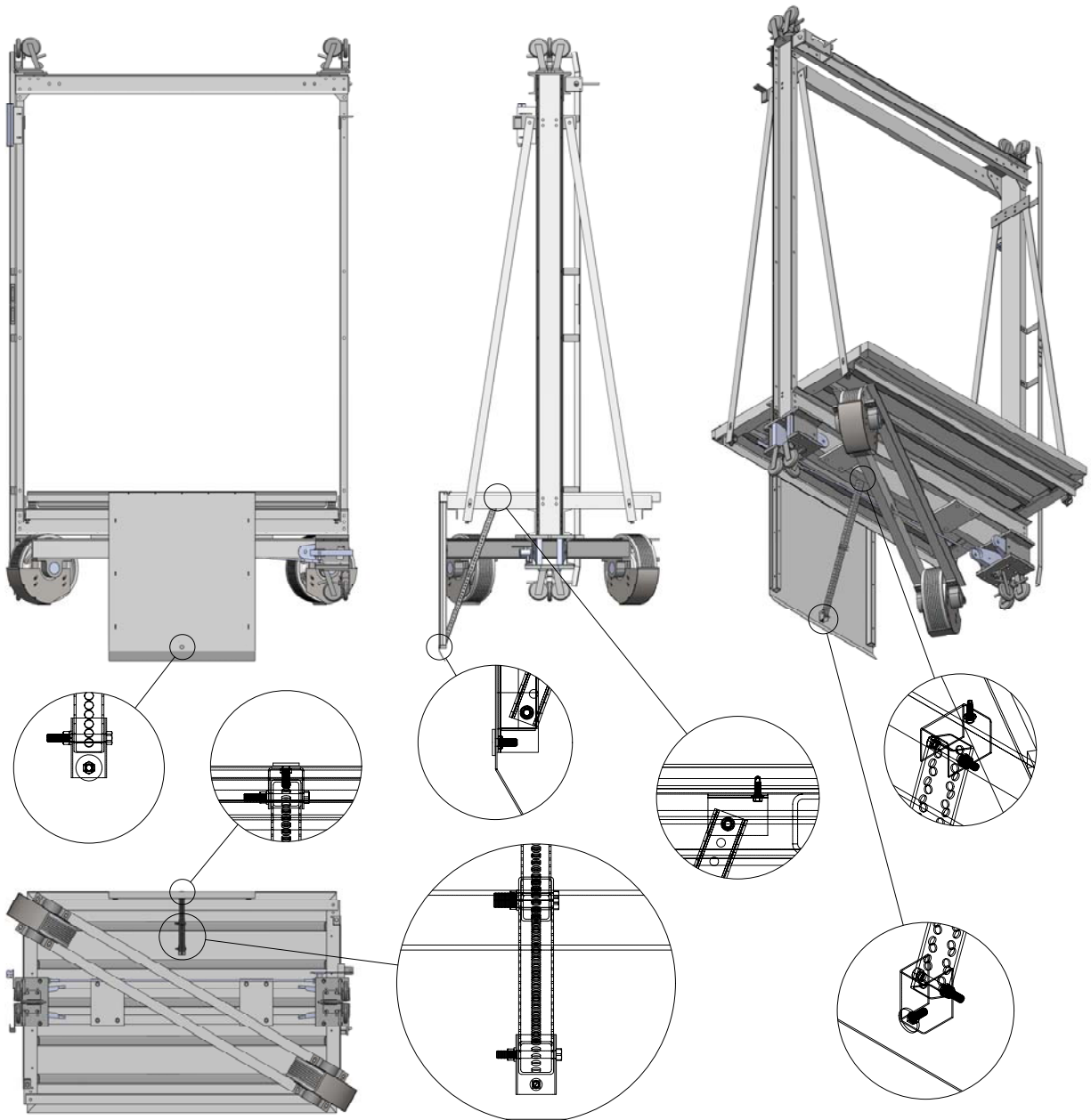
Figure 3.10 Apron Assembly



Apron Brace

An adjustable brace is provided for the apron. It is designed to be mounted in the field to accommodate clearance requirements per job. One end of the brace mounts to the bottom of the platform; the other to the back side of the apron.

Figure 3.11 Apron Brace Installation



- The brace adjusts from 26 to 46-inches.
- The end attaching to the platform uses a self-drilling, self-tapping hex bolt.
- Apron end secures with an elevator, square-neck bolt. A 3/8" hole must be drilled.

Hoisting the Sling and Platform

**Danger**

The governor must be roped and the car safeties adjusted and made operational prior to hoisting the car sling. In the event of a failure (e.g. failure of a support sling(s)) or a free-fall, the governor must mechanically actuate the safeties, stopping the car.

**Caution**

All employees working in the hoistway at a level greater than 6 feet above the bottom of the shaft must use fall protection consisting of a body belt/harness and lanyard connected to an independent lifeline. Compliance with OSHA and/or governing safety authority is the responsibility of the elevator contractor.

**Danger**

If the car sling and platform is raised/hoisted to the top of the shaftway to be roped, it must be positively secured by setting the car safeties at this elevated level. In addition, one or a combination of the following must be completed:

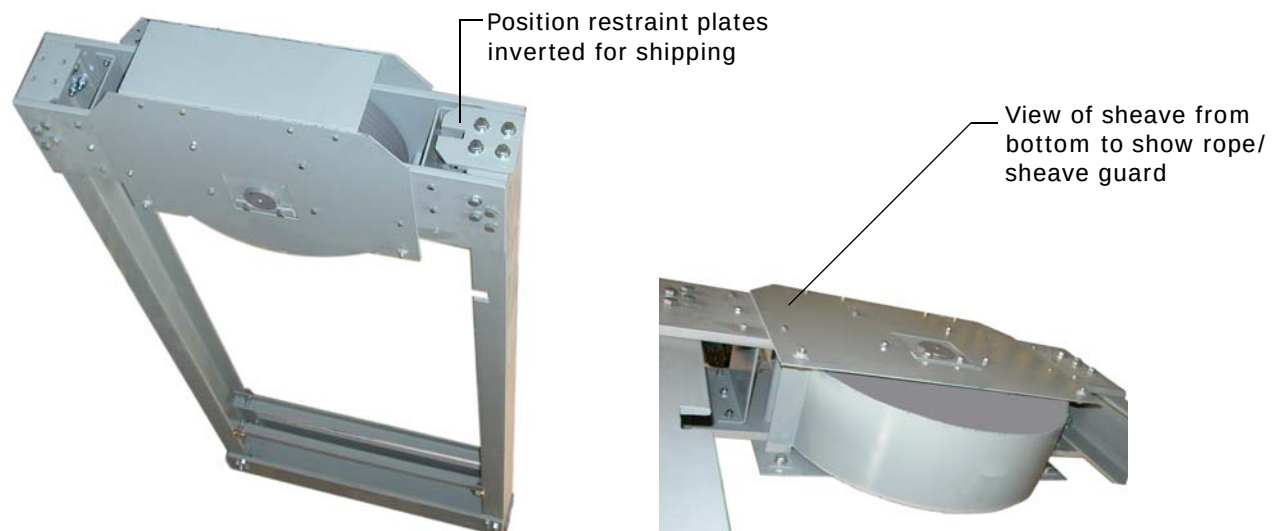
1. Roller guides must be mounted before moving the sling and platform.
2. A deck or platform of sufficient strength must be built immediately below the car platform to support the platform in the event of a safety failure.
3. The car sling must be positively secured by placing bolts through the car guide rails so the “safety jaws” rest on these bolts or using other approved supports.
4. Additionally, the top member of the car sling (crosshead) must be lashed to the rails and/or divider beams using at least one wire rope sling of sufficient strength per rail. To prevent deterioration of the slings, padding or other means of protection must be provided at the points where the slings contact the structural members.

Counterweight Installation

Materials required to install the counterweight are:

- Counterweight Frame Assembly
- Counterweight Buffer
- Counterweight roller guides - ELSCO D or C models (refer to construction drawings)
- Rope stretch compensation blocks
- Counterweight fillers/weights (Refer to construction drawings to see if “starter” weights are used prior to stacking remaining weights.)
- Counterweight stack retention angles
- Counterweight safeties (if required)

Figure 3.12 Counterweight Frame Assembly



Danger

Working with unroped counterweight components is extremely dangerous. You must ensure that all components are safely and adequately supported during construction. Support failure or collapse can result in extreme injury or death.

Note

Contact your MCE Project Manager for weight stack count to achieve working capacity for a running platform. Counterweight stack retention angles must be in place and securely fastened while operating running platform.

Counterweight Buffers

Depending on clearance requirements in the pit, buffers may be mounted directly on pit channels or on buffer stands that are mounted on the pit channels. Buffer stand braces may also be provided. The installation might require hydraulic (oil) buffers or spring buffers. Refer also to [Car Buffers on page 3-22](#) for specifications and oil information. Refer to construction drawings for buffer type and installation specifics.

Oil Buffers

Oil buffers are designed to absorb impact and reduce “bounce back.” In addition to oil, they contain a chamber filled with compressed nitrogen gas to keep the piston in its extended position. The gas chamber is permanently sealed. **The oil chamber must be filled after the shipping retainer is removed and the buffer is extended at the site.**

Dip stick: The dip stick is topped with a wing nut. Lightly tightening the wing nut secures the dip stick and seals against possible contamination. After installing and extending the buffer, remove the dip stick and fill the buffer with the proper hydraulic oil. Thereafter, check oil level using the dip stick.



Caution

Buffer oil is not provided due to transportation of hazardous materials restrictions. Buffer oil must be purchased locally.

Oil buffer design and size vary depending on service load and car speed. The buffer is shipped with an instruction sheet that you should read explaining oil type and how to check oil level. Additionally, the label on the buffer lists its service rating. You should check this to see that the buffer is correct for the application. [See type and volume tables page 3-23.](#)



Danger

When you release the piston after installing an oil buffer, it will extend very quickly. Keep clear to avoid injury. After initial oil fill, wait a half hour or so and re-check level.

Spring Buffers

Spring buffer stroke is determined by the height of the buffer base in the interior of the spring. Permanently attached buffer tags provide the stroke information which may be checked with a simple measurement from the top of the spring to the top of the restriction tube. Buffers and bases then, are matched sets (stroke/diameter/mass) and must not be mixed.

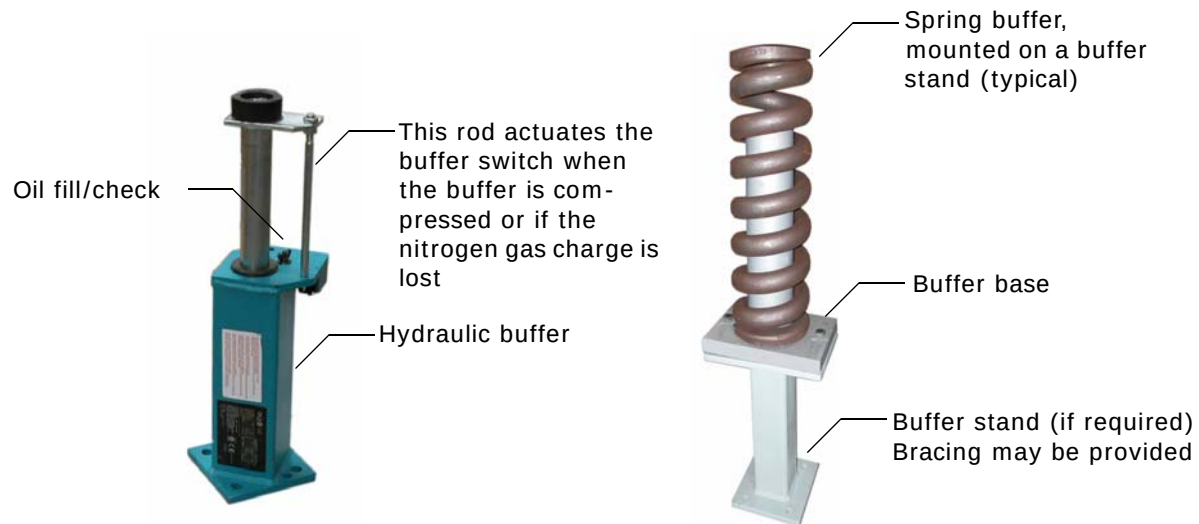
Switches

Oil buffers have switches that must be connected to the elevator controller as shown in the controller wiring diagrams. **It is imperative that switch wiring and conduit be routed so that, when compressed, the switch actuator rod does not impact the wiring and conduit to the switch.**

Note

Verify that the label on the buffer matches construction drawings to be certain you are using the correct (car or counterweight) buffer in each location.

Figure 3.13 Buffer Examples



Buffer Switch Adjustment

Piston compression of 1/2 inch (13mm) must cause the switch to open.

1. Attach an ohm meter across the switch leads.
2. Compress the buffer 1/2 inch.
3. Verify that the switch opens.
4. Adjust as needed.

Counterweight Safeties

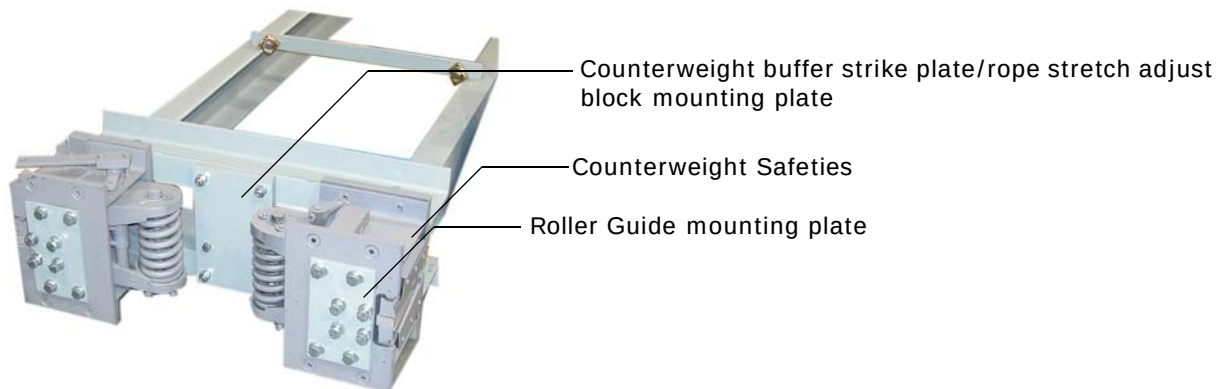
If required (occupied space below hoistway), counterweight safeties are installed as shown in the construction drawings. Typically, counterweight safeties are installed between the counterweight and the roller guides on the bottom of the counterweight. [Please refer to “Safety Adjustment” on page 3-41](#) for additional information.



Caution

If counterweight safeties are used, a counterweight overspeed governor is provided. Car and counterweight governors are calibrated differently. **BE CERTAIN** that the correct governor is used in the correct location. Governors are appropriately labeled at the factory.

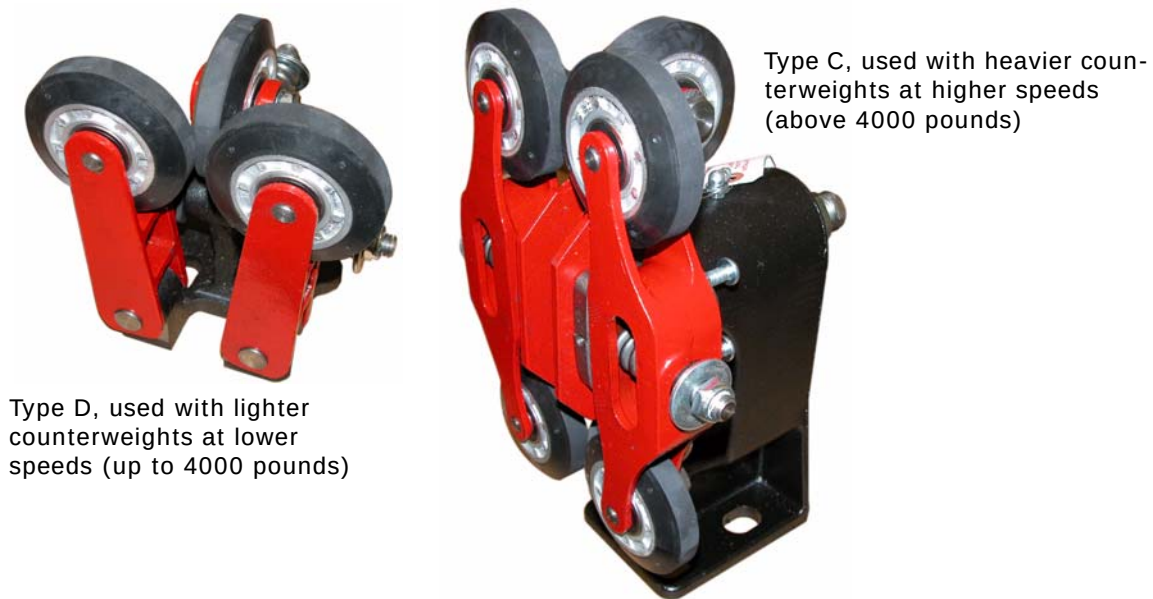
Figure 3.14 Counterweight Safeties



Counterweight Roller Guides

MCE Freedom elevators use Elsko roller guides on car and counterweight.

Figure 3.15 Counterweight Roller Guides



1. Place and support the counterweight frame directly over the counterweight buffer channel.
2. Make sure it is well secured and in no danger of falling or dropping.

The four corners of the counterweight assembly are prepared with pre-tapped roller guide mounting/rail retention plates.

Note

The Appendix section of this manual contains instruction sheets for the standard, Elsko roller guides used by MCE. They are for reference use. The instruction sheet shipped with the roller guides may be newer and is the controlling document if questions arise.

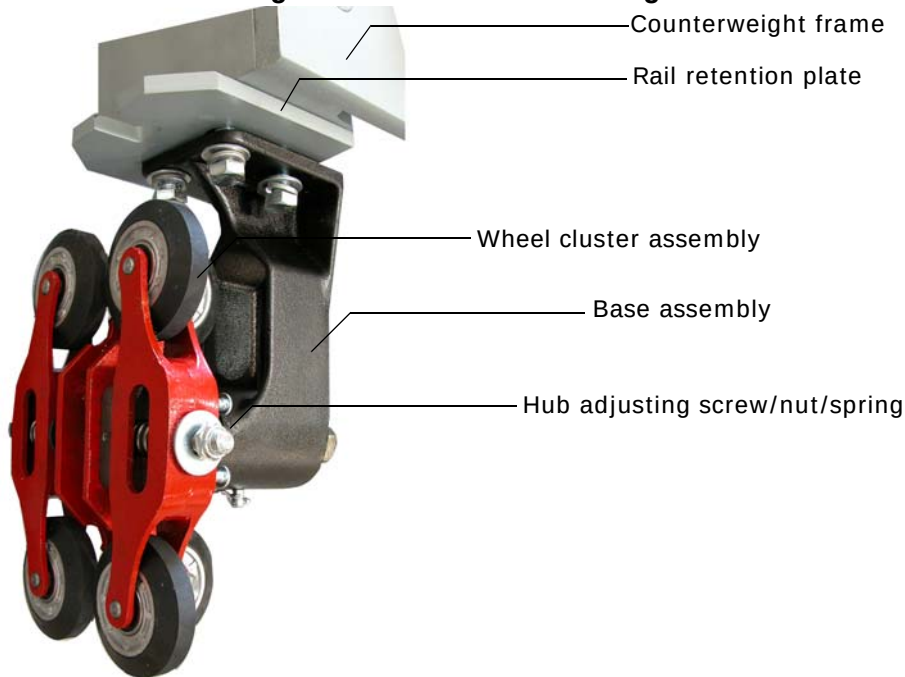


Caution

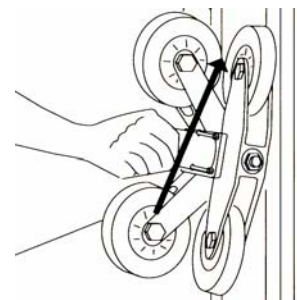
If you are installing more than one car, check the job drawings very carefully to be certain you are using the correct roller guides for each installation. Different roller guides are provided depending upon car weight and contract speed. In addition to guide model differences, different roller materials may also be used. Refer to the construction drawings to verify proper guide location.

Elsco provides an instruction sheet describing roller guide installation, adjustment, and replacement parts. This document describes mounting the roller guide to the MCE counterweight frame.

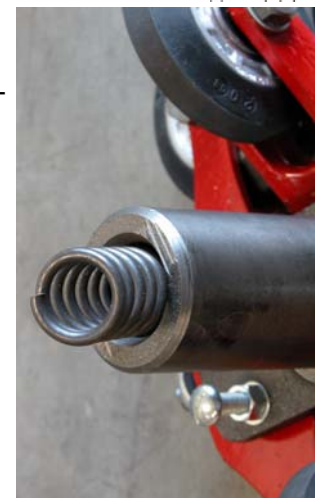
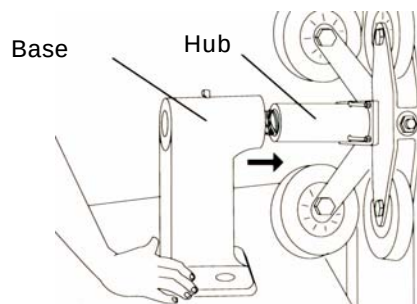
Figure 3.16 Counterweight Roller Guide Mounting



1. Refer to the Elsko installation instruction. Press and roll (upward) the wheel cluster assembly **only** onto the rail face until the center wheels are flat against the face of the guide rail blade. See the illustration to the right.



2. Insert the coil spring completely into the hub of the wheel cluster assembly.
3. Slide the mounting bracket (mounting base toward the counterweight) onto the hub of the wheel cluster assembly.



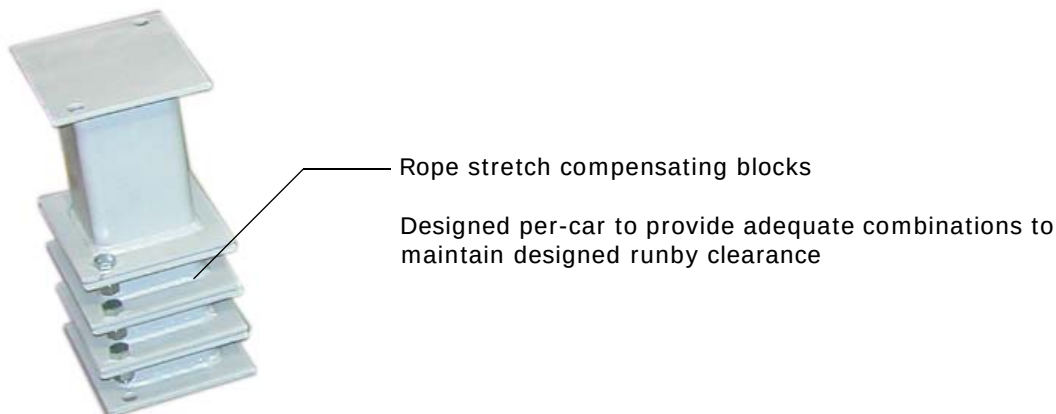
4. Using the 1/2"-11 x 2" bolts, flat, and lock washers provided, attach the seismic plate and then the mounting bracket base to the counterweight frame.
5. Tighten lightly so that position may be adjusted. Adjust the seismic plate/guide mount so that there is 3/16" clearance between the back of the seismic plate notch and the rail blade face. The rail blade should also be centered between the sides of the notch.
6. Repeat for the remaining seismic/mounting plates and roller guides.

Refer to the ElSCO instruction for remaining lubrication, installation, and adjustment instructions.

Rope Stretch Compensators

Rope stretch compensating blocks are attached to the bottom of the counterweight strike plate. Initial stretch may or may not make it logical to remove the bottom block to maintain the designed runby clearance. During the first 8 weeks of operation, at a minimum, you should check ropes at least weekly and do what is necessary to maintain runby as the ropes continue to stretch. The typical arrangement is a base block with three 2-inch adjusting blocks.

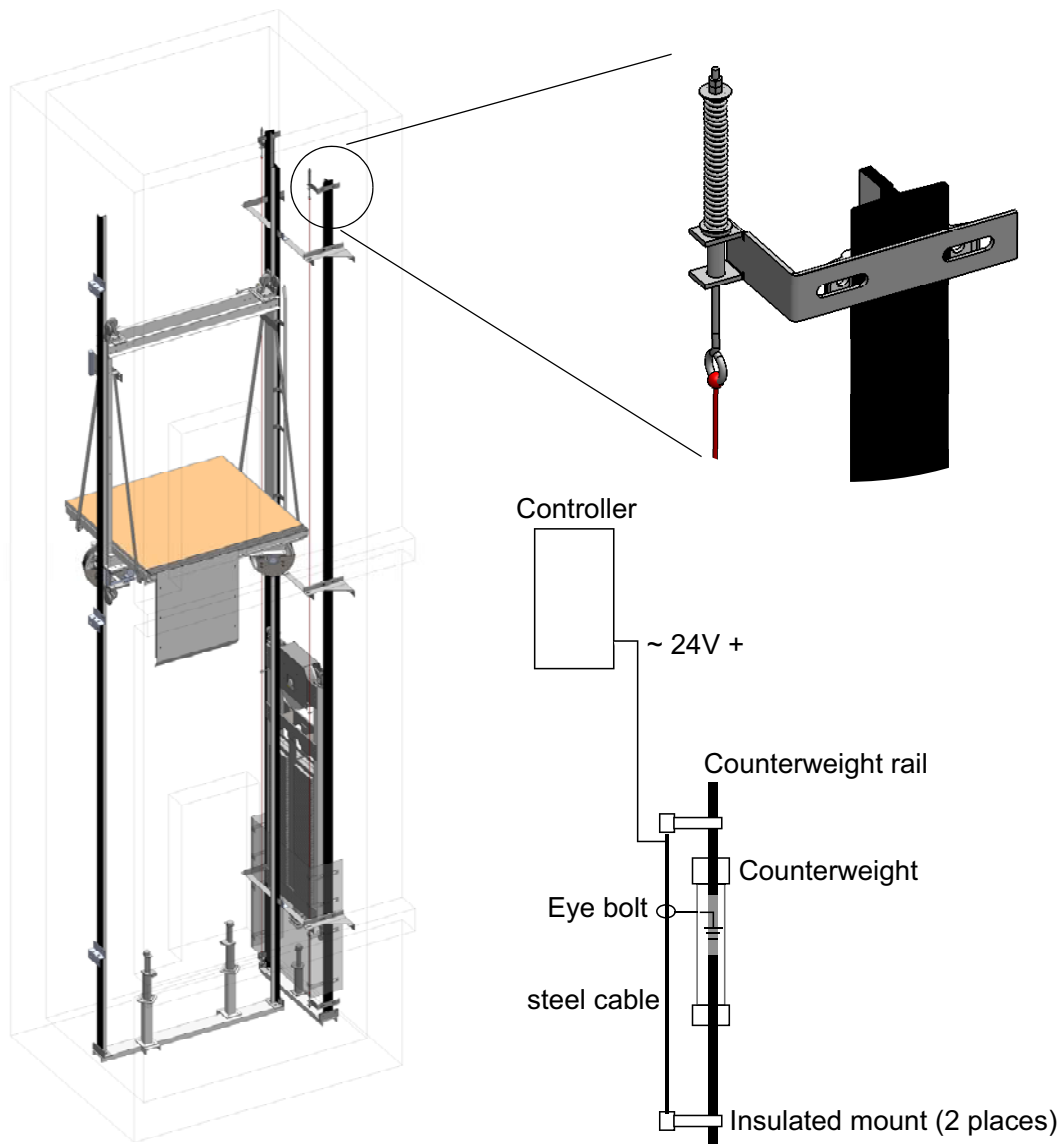
Figure 3.17 Rope Stretch Compensator Blocks



Counterweight Seismic Detector

When required, Freedom elevators are provided with a counterweight seismic movement detector. The detector consists of a light steel cable that runs from an insulated point of connection, through the center of the eyelet of a grounded eye bolt attached to the counterweight frame, and finishes at a second insulated point of connection. The insulated connection points are mounted on the counterweight guide rail; one above counterweight travel, the other below. The steel cable is connected to a 24V signal from the elevator controller. If the counterweight moves sufficiently that the eyelet of the grounded bolt shorts the cable travelling through it, the controller voltage is pulled low and the controller “senses” the counterweight movement. Two of these “strings” are used; one for each vertical stile of the counterweight frame. If a “ring and string” seismic detector is used, refer to the MCE construction drawings for physical mounting information and to the elevator controller manual for electrical connections. The universal rail mounting brackets shown below are shipped along with an OEM kit. Please use the universal brackets and dispose of the brackets shipped with the OEM kit.

Figure 3.18 Counterweight Seismic Movement Detector

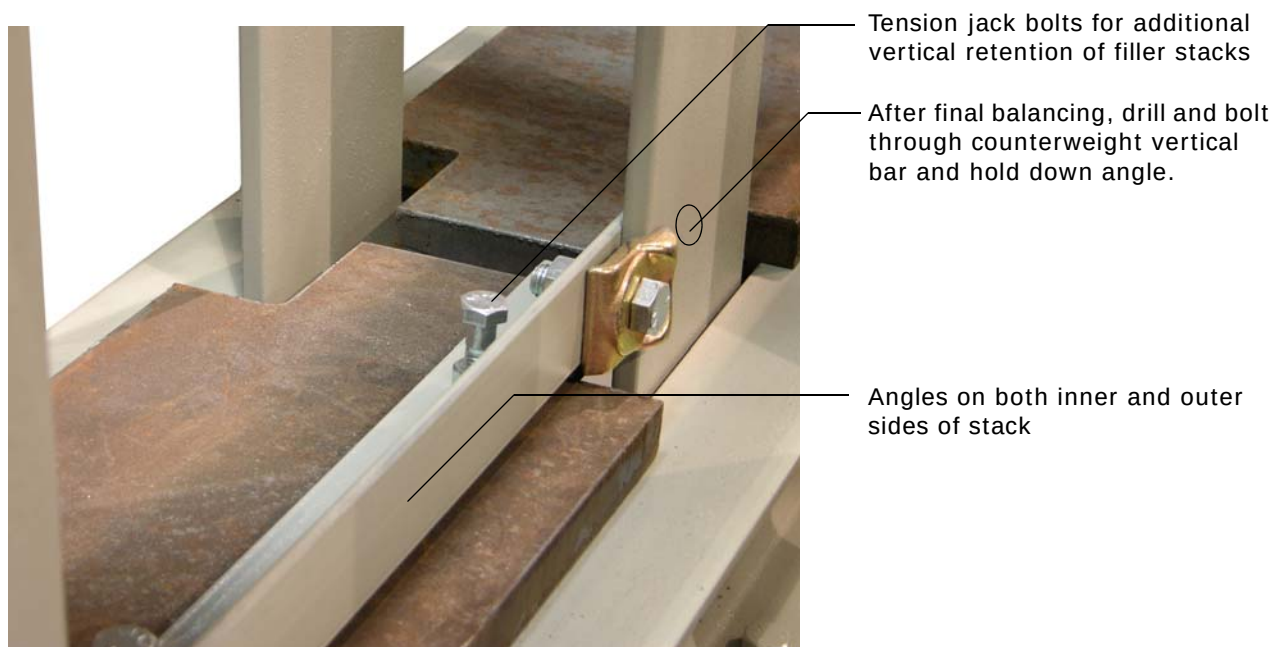


Counterweight Fillers

Counterweights fillers are standard steel plate. They are inserted in the counterweight frame in one or more stacks, each retained by a tab in the C-channel slot. Each stack has an independent lock-down/retention assembly. (Refer to construction drawings to see if “starter” weights are used prior to stacking remaining weights.)

1. Insert the correct number of fillers in the counterweight frame to achieve the counterweight percentage indicated on the construction drawings.
2. Apply pressure to lock-down angles so that there is good contact between angles and stack.
3. Lock angles in place using hardware, and rail clips as shown.
4. Once the car and counterweight have been properly balanced, secure the lock-down angles in place by drilling through the counterweight frame and the angle and using 1/2” bolts, nuts, and lock washers provided to prevent any possibility of the stack shifting. See the illustration below for drill locations.
5. Finally, tighten and lock the filler-tensioning jack bolts on the top surfaces of the lock-down angles to prevent noise or vibration from the filler stacks.

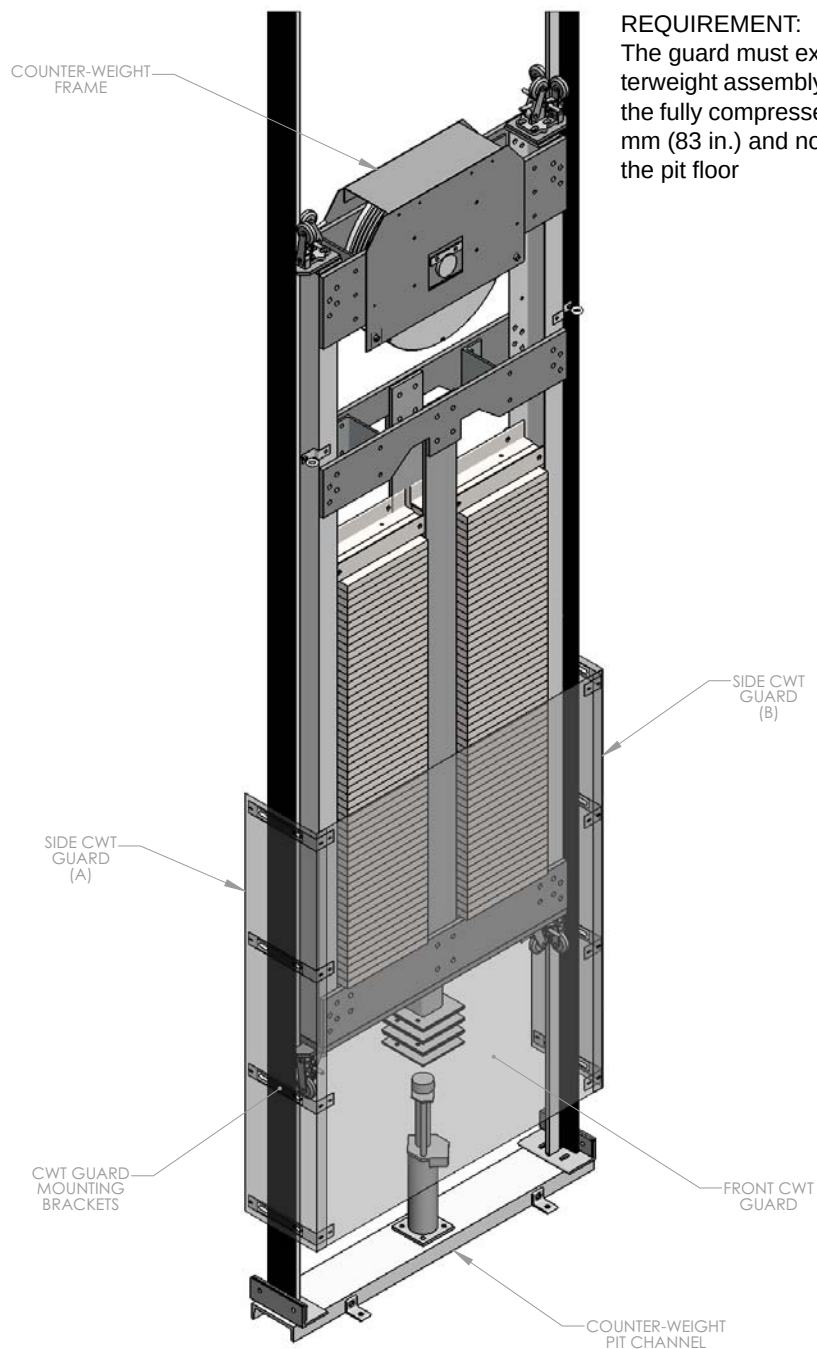
Figure 3.19 Counterweight Lock-down and Fillers



Counterweight Guards

Refer to the following illustration. Attach counterweight guard mounting brackets to the counterweight rails using forged rail clips and provided hardware. Mounting brackets have tapped holes to attach sheet metal guards.

Figure 3.20 Counterweight Guards



REQUIREMENT:

The guard must extend from the lowest part of the counterweight assembly when the counterweight is resting on the fully compressed buffer to a point not less than 2 100 mm (83 in.) and not more than 2 450 mm (96 in.) above the pit floor

Car Buffers

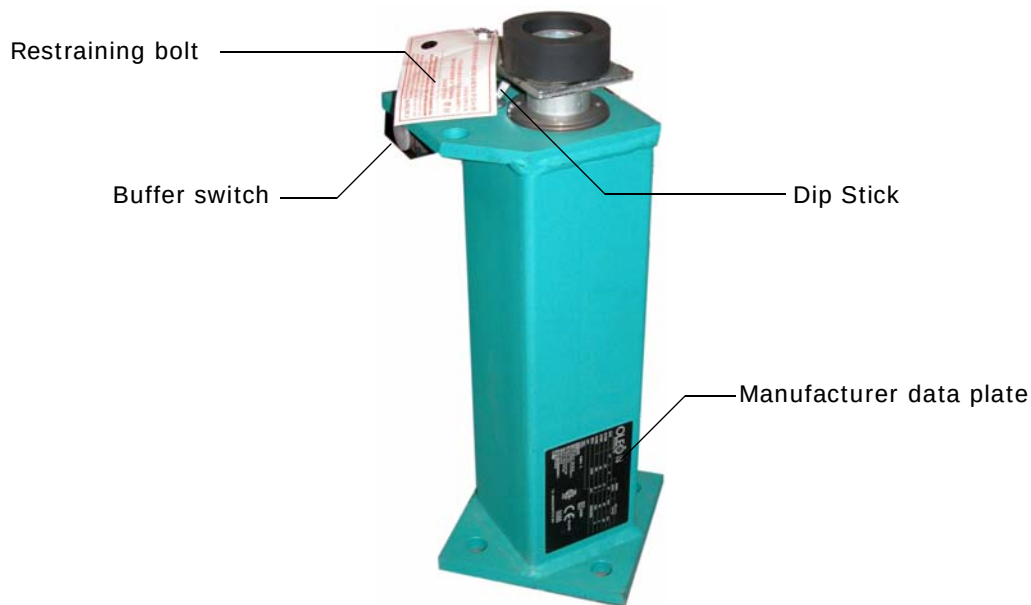
Install the car and counterweight buffers on their respective stands as shown in the construction drawings. If required, spring buffers may be used for slower car speeds (200 FPM and below). Hydraulic buffers are required for higher speeds.

Ensure buffers are:

- Mounted in the rotational orientation indicated on the construction drawings (sometimes critical to proper clearance)
- Securely fastened in place (both buffers and stands)
- Vertical and aligned with striker plates on car and counterweight
- That the buffer data plates are in place and correctly describe the buffer
- That the extended buffer is the correct height
- That, when compressed, buffer switch actuator rod will not contact switch wiring conduit.

Hydraulic buffers must be extended and filled with oil before use. Recheck 30 minutes after initial fill and periodically thereafter.

Figure 3.21 Hydraulic Buffer



- Restraining bolt: Allows the buffer to be held in a compressed position during shipment. Once a buffer is mounted in place, the restraining bolt is removed to allow the buffer to extend.



Danger

Buffer extension can happen quickly! Keep clear to avoid injury.

- Dip stick: The dip stick is topped with a wing nut. Lightly tightening the wing nut secures the dip stick and seals against possible contamination. After installing and extending the buffer, remove the dip stick and fill the buffer with the proper hydraulic oil. Thereafter, check oil level using the dip stick.
- After initial fill, allow the buffer to sit for thirty minutes before checking level. Add more oil if needed.

Table 3.1 Buffer Oil

Mobil	Esso	Shell	Sunoco	Texaco
D.T.E. 26	Nuto H 68	Tellus Oil 68	Sunvis 831 WR	Rando oil HDC 68
These hydraulic oils meet ISO VG 68 requirements.				

- Buffer switch: Connect in the elevator safety string as shown in the controller job prints taking care that when compressed, the switch actuator rod will not contact switch wiring or conduit.
- Manufacturer data plate: Describes the buffer and indicates oil type.

Table 3.2 Hydraulic Buffer Specifications

Model	Stroke in (mm)	Overall Height in (mm)	Oil Volume USG (liters)
SEB 16	6.81 (173)	21.26 (540)	0.4 (1.45)
SEB 18	8.62 (219)	25.32 (643)	0.47 (1.77)
SEB 20	10.98 (279)	30.59 (777)	0.60 (2.20)
SEB 25	17.13 (435)	44.33 (1126)	0.87 (3.30)
LB 16	7.99 (203)	24.26 (616)	1.22 (4.62)
LB 18	9.8 (249)	28.43 (722)	1.47 (5.58)
LB 20	11.81 (300)	33.00 (838)	1.75 (6.64)
LB 23	15.24 (387)	40.83 (1037)	2.23 (8.45)
LB 25	18.19 (462)	47.64 (1210)	2.64 (10.00)
LB 32	27.52 (699)	67.13 (1705)	5.28 (20.00)
LB 35	34.68 (881)	82.96 (2107)	6.47 (24.50)
LB 40	44.92 (1141)	105.98 (2692)	8.32 (31.50)

Buffer Switch Adjustment

Piston compression of 1/2 inch (13mm) must cause the switch to open.

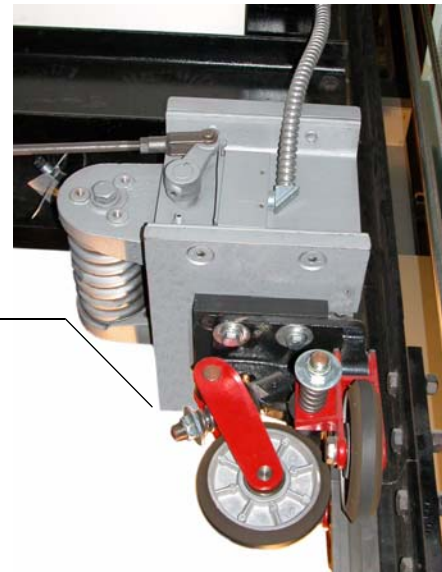
1. Attach an ohm meter across the switch leads.
2. Compress the buffer 1/2 inch.
3. Verify that the switch opens.
4. Adjust as needed.

Car Roller Guide Installation

MCE Freedom elevators use ElSCO car and counterweight roller guides. The roller guide assemblies are generally attached to the safeties on the car bottom and to the crosshead assembly on the car top. Roller guide model and roller composition vary depending upon car speed and capacity. Check the MCE construction drawings for model and wheel composition per location.

Figure 3.22 Typical Bottom Roller Guide Assembly

Typical bottom roller guide mounting to safety. Check the construction drawings to see if there is an adapter plate between the roller guide and safety for the job. Top roller guides are mounted on the top of the crosshead and generally use a debris shield (provided) to protect the rollers.



1. Refer to the construction drawings and to the guide manufacturer instruction sheet.
2. Install the roller guide assemblies as shown, taking care that they are exactly level side-to-side and front-to-back and that the center roller is centered and square on the rail face.
3. For top rollers, attach the seismic plate and the mounting bracket base to the crosshead (see illustration on following page).
4. Tighten lightly so that position may be adjusted. Adjust the seismic plate/guide mount so that there is 3/16" clearance between the back of the seismic plate notch and the rail blade face. The rail blade should also be centered between the sides of the notch.
5. Repeat for the remaining seismic/mounting plates and roller guides.
6. Adjust face and side rollers so that they contact the rail but will "skid" if rotated by hand.

Note

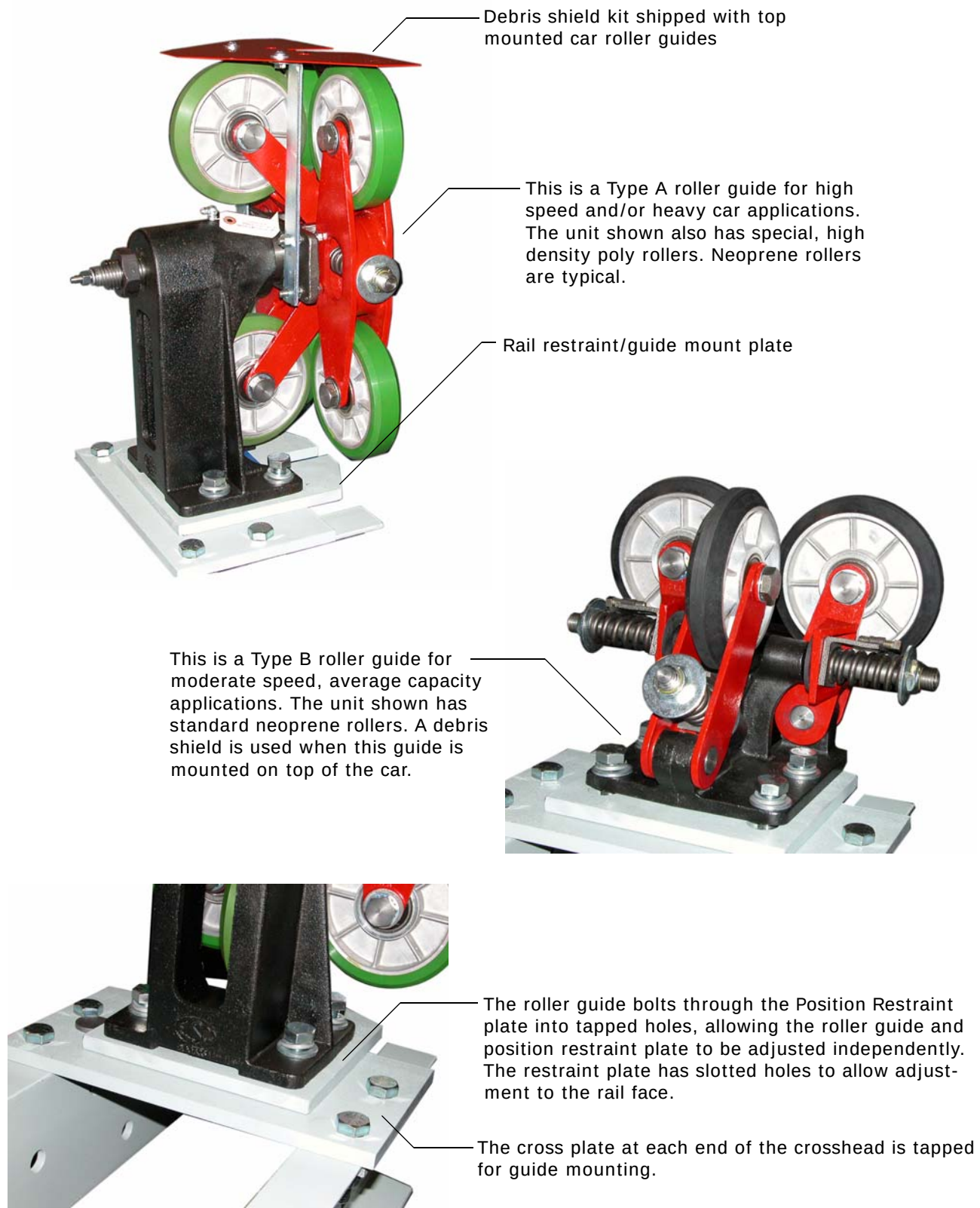
The Appendix section of this manual contains instruction sheets for the standard, ElSCO roller guides used by MCE. They are for reference and future use. The instruction sheet shipped with the roller guides may be newer and is the controlling document if questions arise.



Caution

If you are installing more than one car, check the job drawings very carefully to be certain you are using the correct roller guides for each installation. Different roller guides are provided depending upon car weight and contract speed.

Figure 3.23 Typical Crosshead Mounted Roller Guide Assemblies



Hoist Ropes

Standard MCE elevator packages use Brugg, 8 x 19, right regular lay rope. Ropes are precut to length and shipped per car with each precut rope on its own spool. MCE selects rope and sheaves designed for the roping configuration required, taking into consideration the number and direction of bends, load, sheave diameters, hardness, and grooving. Elevator rope is an integral part of the hoist machine, with its own internally moving parts (wires and lays) and must be considered while engineering the job just as all other critical factors must be.

Note

Rope must be stored properly in a clean, dry area, sheltered from weather and sun and not exposed to contamination by dirt, sand, etc. Failure to store rope properly will result in shortened rope life and potentially, vibration in the elevator car when running. Rope must not be mechanically damaged, dented, or kinked. If any damage is evident, replace the rope prior to commissioning.



Caution

Before roping, validate rope type listed on the construction drawings for each car. Be certain you understand what the stretch characteristics of the rope are so that the correct length of rope is pulled through at the shackles. Once rope is shackled and load applied, **it cannot be lengthened**. Contact MCE if you are not CERTAIN of rope stretch.

Table 3.3 Rope Stretch

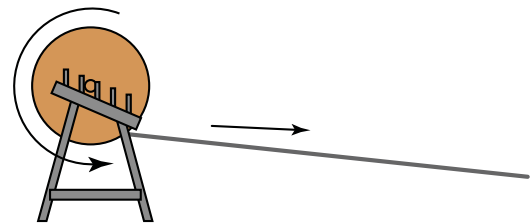
Diameter	Construction	Maximum Construction Stretch per 100'	Maximum Post Construction Stretch per 100'
10mm	8x19, traction steel	0.5% / 6 inches	0.145% / 1.75 inches
1/2"	8x19, traction steel	0.5% / 6 inches	0.145% / 1.75 inches
5/8"	8x19, traction steel	0.5% / 6 inches	0.145% / 1.75 inches
10mm	8x19, extra high strength	0.5% / 6 inches	0.145% / 1.75 inches
1/2"	8x19, extra high strength	0.5% / 6 inches	0.145% / 1.75 inches
5/8"	8x19, extra high strength	0.5% / 6 inches	0.145% / 1.75 inches

Rope Handling

Rope must be properly and carefully handled. In addition to avoiding damage and dirt, you must also remove the rope from the spools properly to avoid kinking.

Generally:

- Raise the reel so it can be easily rotated.
- Have one person walk the rope away from the reel while a second person keeps enough tension on the reel to prevent slack in the rope.
- Uncoil the entire length of rope and allow it to lay in a straight line.
- When rope is laid over a sheave, it should bend in the same manner as when originally wound.
- Rope must never be dragged over an edge, corner, or dirty floor.



Seizing

Precut rope lengths are properly seized (bound with special tape to prevent strands from unwinding) before shipment. After installing rope in shackles, be certain to properly seize the loose end of the rope after clips are installed and prior to cutting excess. Electrical or duct tape is NOT USABLE for seizing rope.

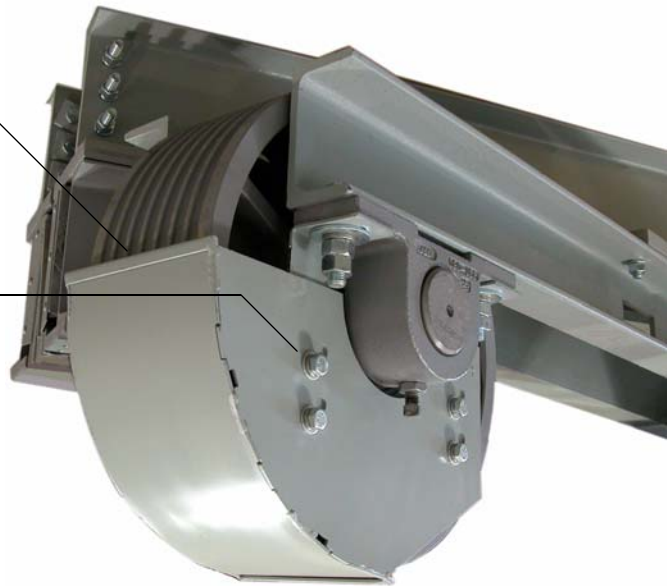
Car Sheaves

The guards for the car sheaves are specially slotted so that they may be shifted out of position when roping the platform. It is not necessary to remove the guards.

Figure 3.24 Car Sheaves

When roping is complete, adjust the sheave guard to provide approximately 1/8 (3mm) of clearance between rope crowns and guard.

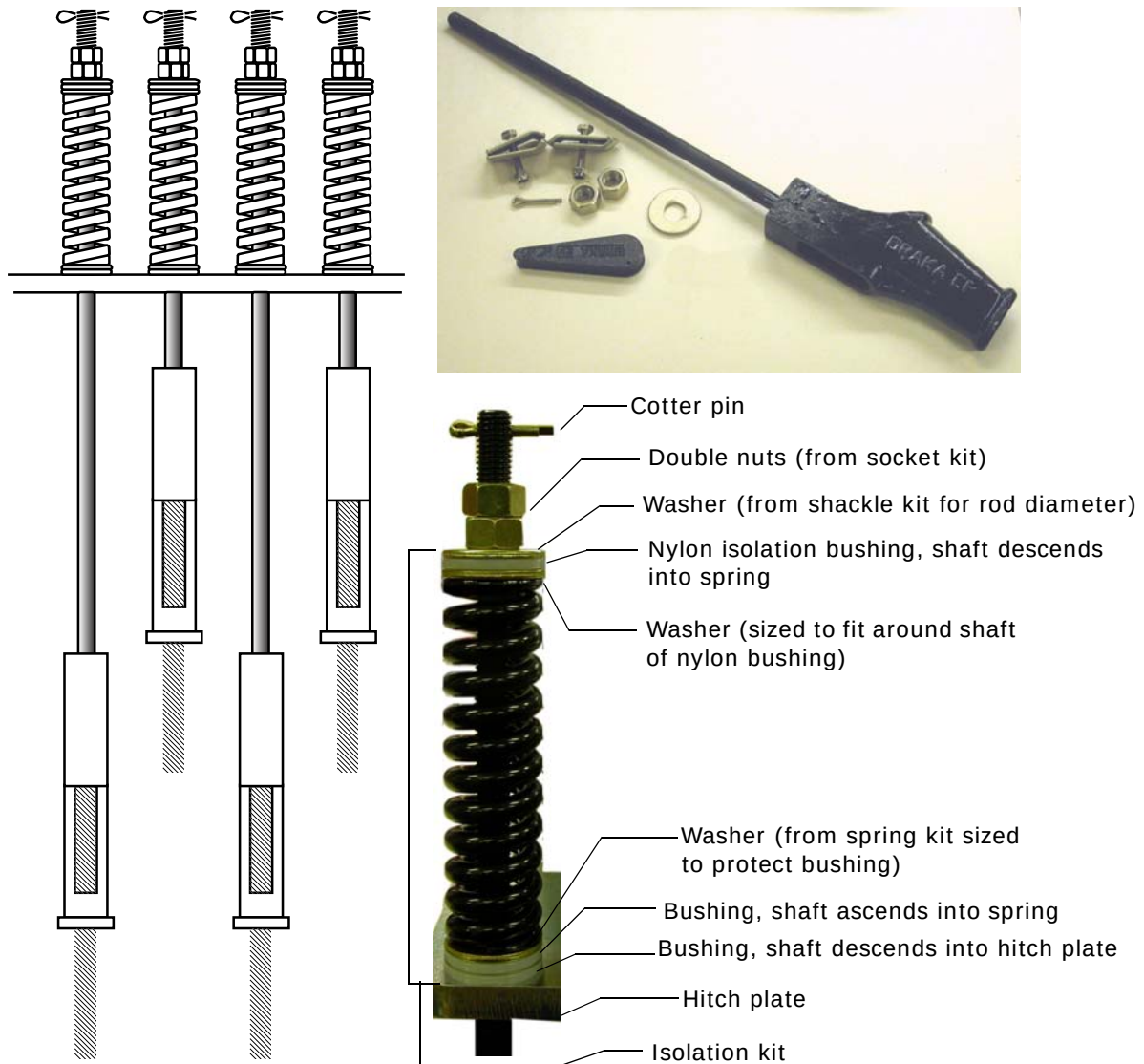
Sheave guard mounts are slotted to allow the guard to be moved away from the sheave for roping.



Hitch Plate Connections

MCE provides a mix of short and long shackles so that the sockets are at a staggered height and clashing is prevented (each rope should have a short shackle on one end and a long shackle on the other so that the lengths of the individual ropes will be the same). Isolation washers, springs, and hardware are provided. These examples are for 2:1 roping. 1:1 roping is similar.

Figure 3.25 Typical Stagger Pattern, Wedge Socket Kit

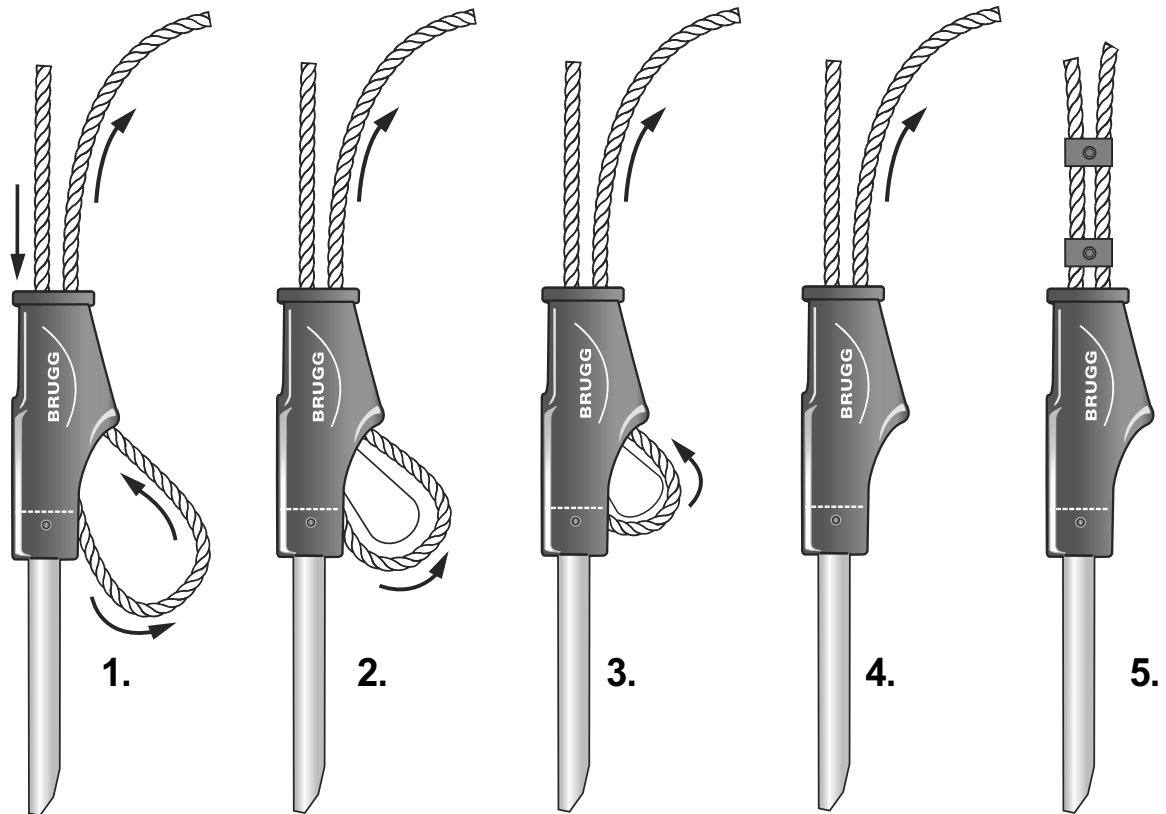


Machine Room

Floor penetrations for rope fall locations to be provided per MCE construction drawings. Minimum rope clearances must be maintained in all directions. Floor sleeves may be required. Such determination must be made locally by the elevator contractor.

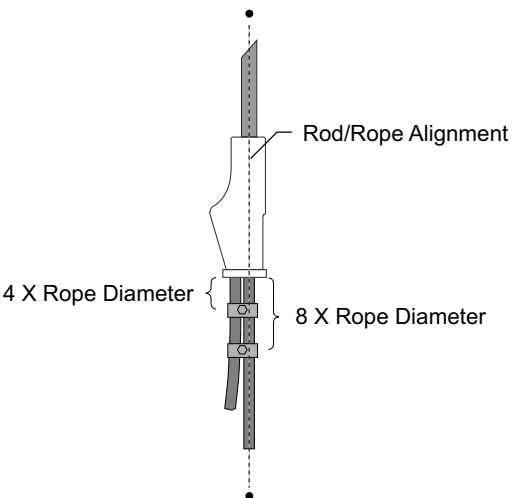
Rope Wedge Sockets

Figure 3.26 Wedge Socket Installation (art/information courtesy of BRUGG)



1. Insert end of rope down through wedge socket. Ensure rope is not slack. Thread end of rope back up front side of socket, leaving minimal loop to install wedge. Be sure rope is placed as shown in socket.
2. Install wedge.
3. Pull on rope to maintain tension. Pull up loose end quickly. Loop will tighten, drawing the wedge within the socket.
4. Seat the wedge firmly. Let car and counterweight mass rest on ropes. Rope and wedge should rise about 1 inch (2.54 mm) to final set. Cut rope surplus, retaining about 6 inches (15.24 mm) (slightly more for 5/8" rope) to create tail section.
5. Use a minimum of two retaining clips; the nearest a maximum of four times rope diameter below the socket; the next a maximum of eight times the ropes diameter. (See following page also.)
6. Slack may be adjusted by inserting a drift pin and tapping the wedge with a hammer between rope bearing and dead ends. Adjust retaining clips as necessary if weight causes movement. Tensioned rope must be in line with shackle rod.

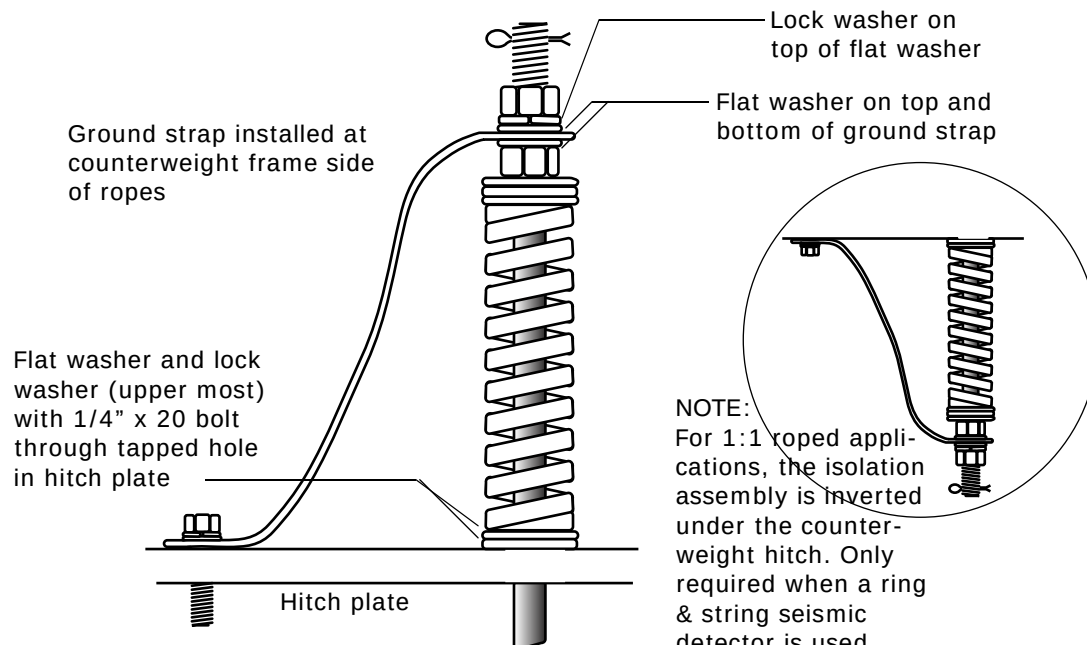
Table 3.4 Rope Clip Spacing

Rope Diameter	Shackle to #1 Max	Shackle to #2 Max	Shackle to #3 Max	Rope Turn Back	Example
10 mm	1.5 " 38 mm	3" 76 mm	N/A	6.75" 172 mm	
1/2 inch	2" 51 mm	4" 102 mm	6" 152 mm	11 1/2" 292 mm	
5/8 inch	2.5" 64 mm	5" 127 mm	7 1/2" 190 mm	12" 305 mm	

Shackle Grounding

Passenger safety requires properly grounded elevator installations. MCE provides a kit with an appropriate number of grounding straps. One (all jobs) must be installed between the steel cab of the elevator and the sling stile ([Cab Grounding on page 4-42](#)); a second must be installed from one of the hoist rope shackles to the counterweight hitch plate; a third must be used to ground the machine when the machine is mounted on isolation pads.

Figure 3.27 Shackle Ground Strap



Rope Tension

Immediately after rope is installed and bearing operating weight, you must check rope tension with a suitable device. Matching torque on shackle nuts is NOT ADEQUATE because springs and hardware are not manufactured to suitable tolerances.

- Using a device like the Brugg RPM (Rope Performance Measurement) tool, adjust rope tension identically on all ropes. [Please refer to “OEM Documentation Inclusions” on page 5-13.](#)
- Check runby and adjust rope tension weekly for at least eight weeks. Thereafter, check tension and counterweight runby during the regular maintenance visits.

Note

Equalizing rope early in the construction process will prevent abnormal sheave groove wear and stress on individual ropes. We recommend equalizing rope tension as soon as possible.

Rope Lubrication

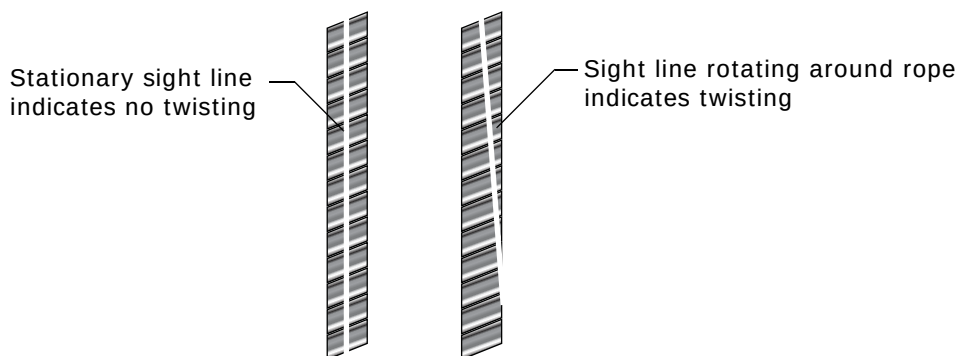
After installing, check for sufficient car rope lubricant and lubricate if indicated. Lubrication is suggested if rope appears dry. Use only recommended amounts of approved elevator rope lubricant. Improper lubrication can interfere with the friction between rope and machine sheave, damaging or destroying the ability of a traction machine to properly raise and lower the car.

- At a minimum, ropes should be lubricated once per year or when dry to the touch.

Rope Twisting

During installation, rope may become twisted. Twisted rope has a shorter lifetime and may even affect the ride of the elevator. Twisting is easier to see if the rope manufacturer provides a visible line.

Figure 3.28 Rope Twist Detection



1. Run the car on inspection completely through the hoistway, counting the times the sight line rotates around the rope.
2. For 2:1 installations, you should see from 2 to 6 rotations per 100 feet (30 m) of car travel. (1:1 should be fewer than 3 rotations per 100 feet of car travel.)
3. If necessary, turn the shackles of the affected ropes in the correct direction to reduce twisting. Remember to retension the roping system properly afterwards.

Note

If unacceptable twisting remains, check to see that sheaves are properly aligned.

Anti-Rotation

Code requires that a means of preventing the ropes from rotating while allowing freedom of horizontal and vertical movement be installed. Generally, this takes the form of a length of appropriately sized steel cable looped through the bodies of the shackle sockets and the cable ends then being clamped together with Crosby clips. MCE provides two of these kits per elevator.

Figure 3.29 Anti-Rotation



Car Governor Installation

Governors mechanically trigger the car safeties in the event of a descending overspeed. MCE Hollister-Whitney governors have remote governor set and overspeed switch reset functions (120 VAC) for machine room-less applications. Traditional machine room installations do not require remote set/reset capability. Governors are speed and application specific. If counterweight governors are used, car and counterweight governors will be clearly labeled to prevent confusing the two units.



Danger

Governors are supplied per specific contract speed. Governors may not be substituted between jobs nor may they be modified. Using the wrong governor may result in failure to remove power from the elevator machine and brake and failure to deploy the car safeties properly, resulting in damage, injury, or death. Take great care when installing, testing, and maintaining the governor and associated safety gear. **The elevator must never be operated without a functional governor and properly adjusted safeties in place.**

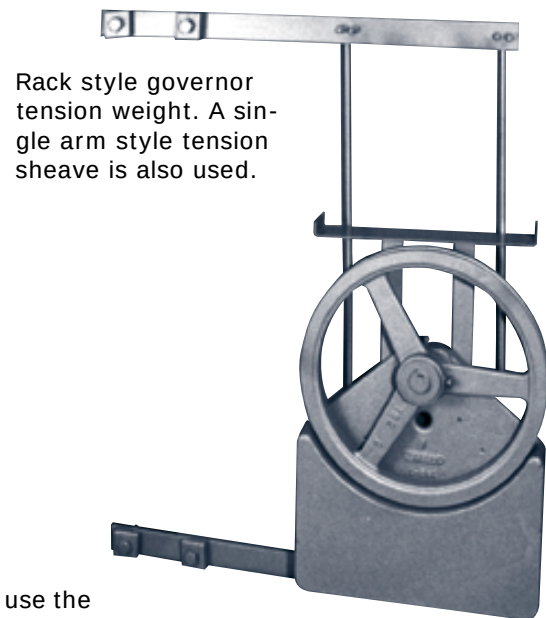
Governor Components

Primary components are the governor and the tension sheave/weight. The tension sheave/weight maintains adequate rope tension between sheave and governor. The overspeed governor may be mounted in the top of the hoistway for MRL applications or in a machine room.

Figure 3.30 Governor Components



Governor, HW207-RS (MRL)



Rack style governor tension weight. A single arm style tension sheave is also used.

Machine room applications use the HW 205 governor. Appearance is much the same but remote set/reset is not provided.

Overspeed Governor Mounting

There is an identifying label on the overspeed governor. Check that the label information meets requirements for the job. If not, do not install the unit. Contact your MCE project manager immediately for replacement.



In the Overhead (MRL) If the MCE elevator package is for a machine room-less installation, a pre-drilled base plate is provided on the machine beams. If hoistway construction does not allow this arrangement, the governor may be mounted lower in the hoistway using alternate mounting methods. See the MCE construction drawings.

The mounting holes on the overspeed governor base plate are slotted to provide some lateral adjustment. For now, secure the unit lightly. Once the tension sheave is mounted in the pit, the two sheaves can be aligned for plumb and then tightened securely. The rope must also align with the actuating mechanism of the safeties. Observe jurisdictional and code guidelines. **NEVER** lubricate governor rope.

Note

For MRL applications, some jurisdictions require access doors. Review MCE construction drawings to see if an access door has been designated. Final confirmation must be made with the inspecting authority and coordinated with the general contractor. This is the responsibility of the elevator contractor.

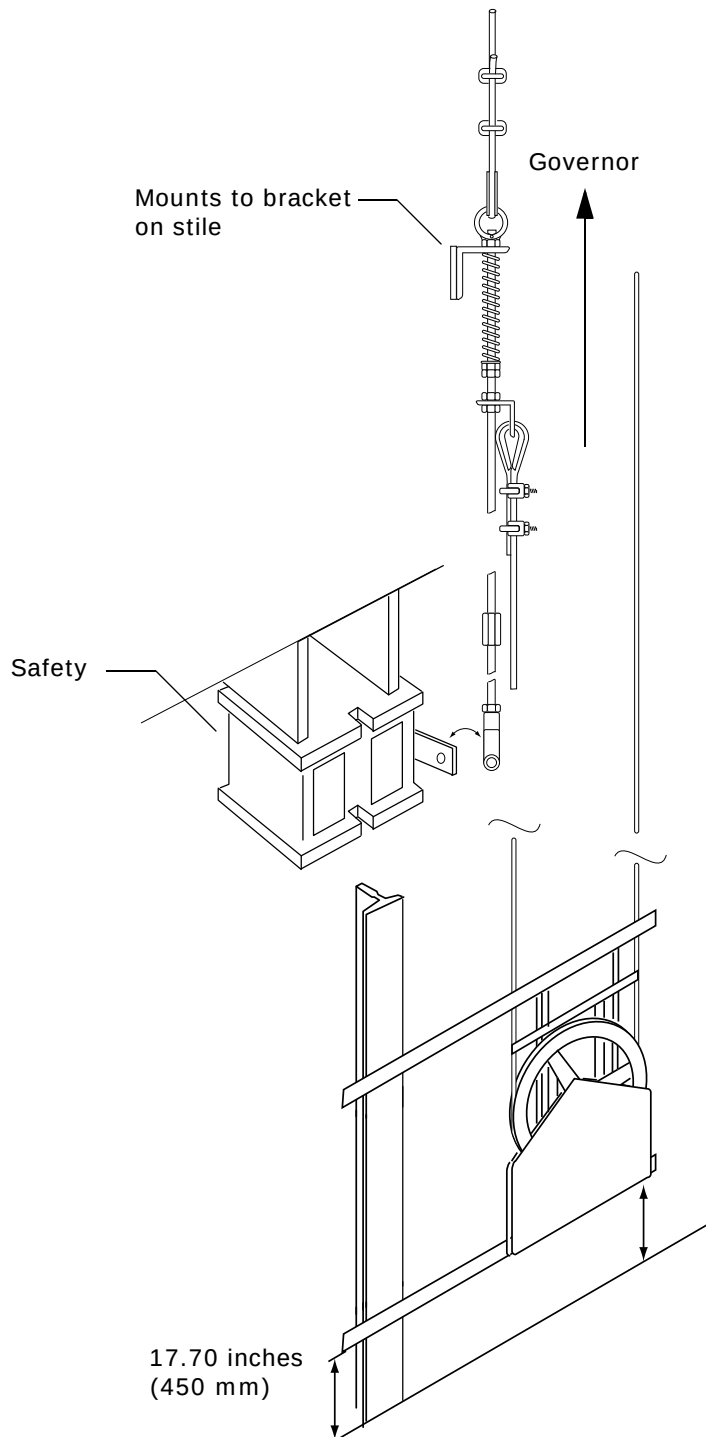
On a Floor (Machine Room) The overspeed governor may be mounted directly on the floor, or it may be mounted on a support bracket depending on design and load bearing. Observe jurisdictional and code guidelines. Floor rope perforations should be kept as small as possible. Sleeves may be required and, if so, must be provided locally by the elevator contractor.

The mounting holes on the overspeed governor base plate are slotted to provide some lateral adjustment. For now, secure the unit lightly. Once the tensioner is mounted in the pit, the two sheaves may be aligned for plumb and then tightened securely. The rope must also align with the actuating mechanism of the safeties. **NEVER** lubricate governor rope.

H-W Tension Weight Installation and Safety Linkage

Mount the governor tension weight to the car guide rail using forged clips and provided hardware as shown in the MCE construction drawings.

Figure 3.31 Tension Weight Install Overview



H-W Governor Specifications and Parts List

Figure 3.32 HW207 RS Specifications 1

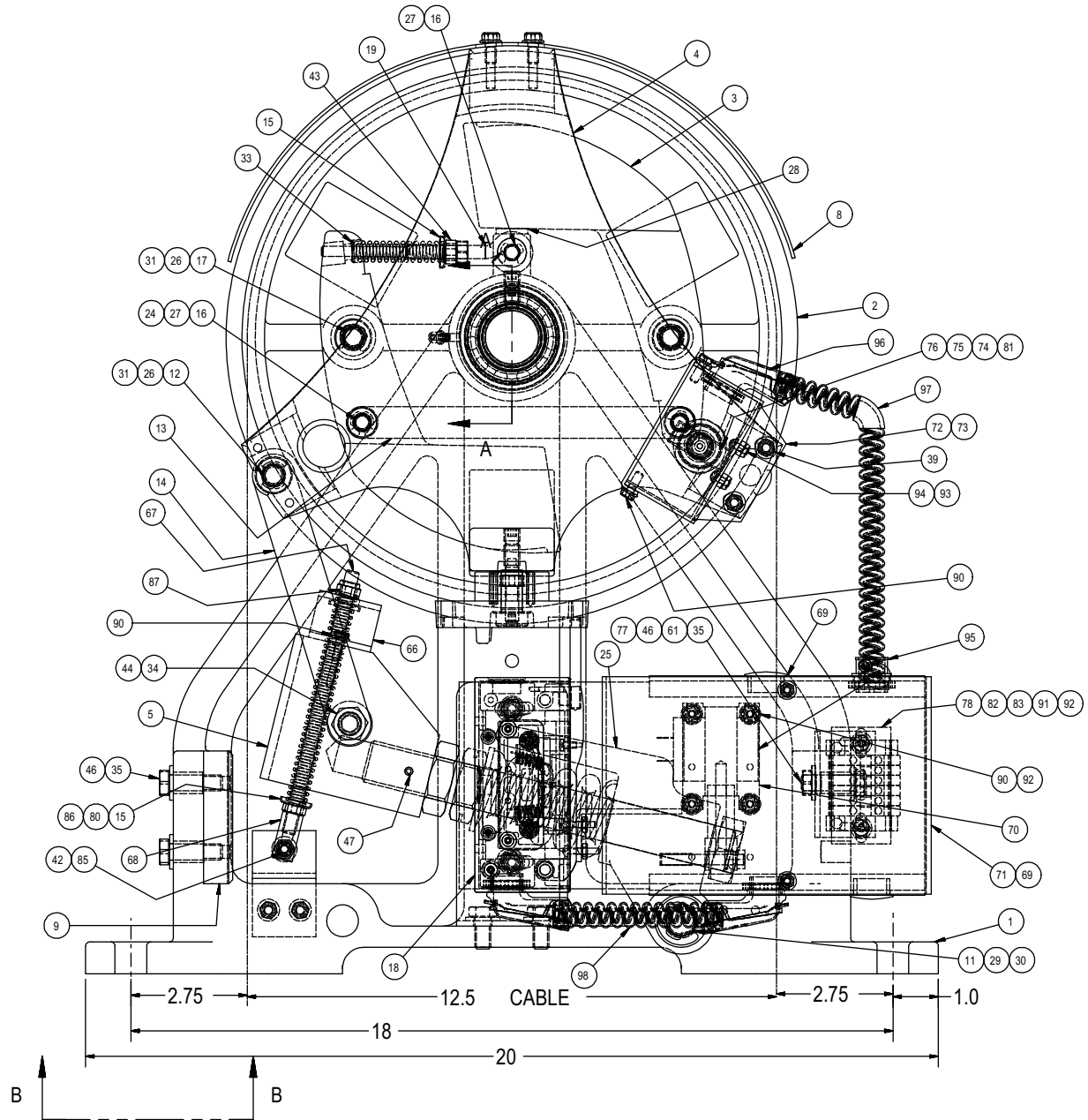


Figure 3.33 HW207 RS Specifications 2

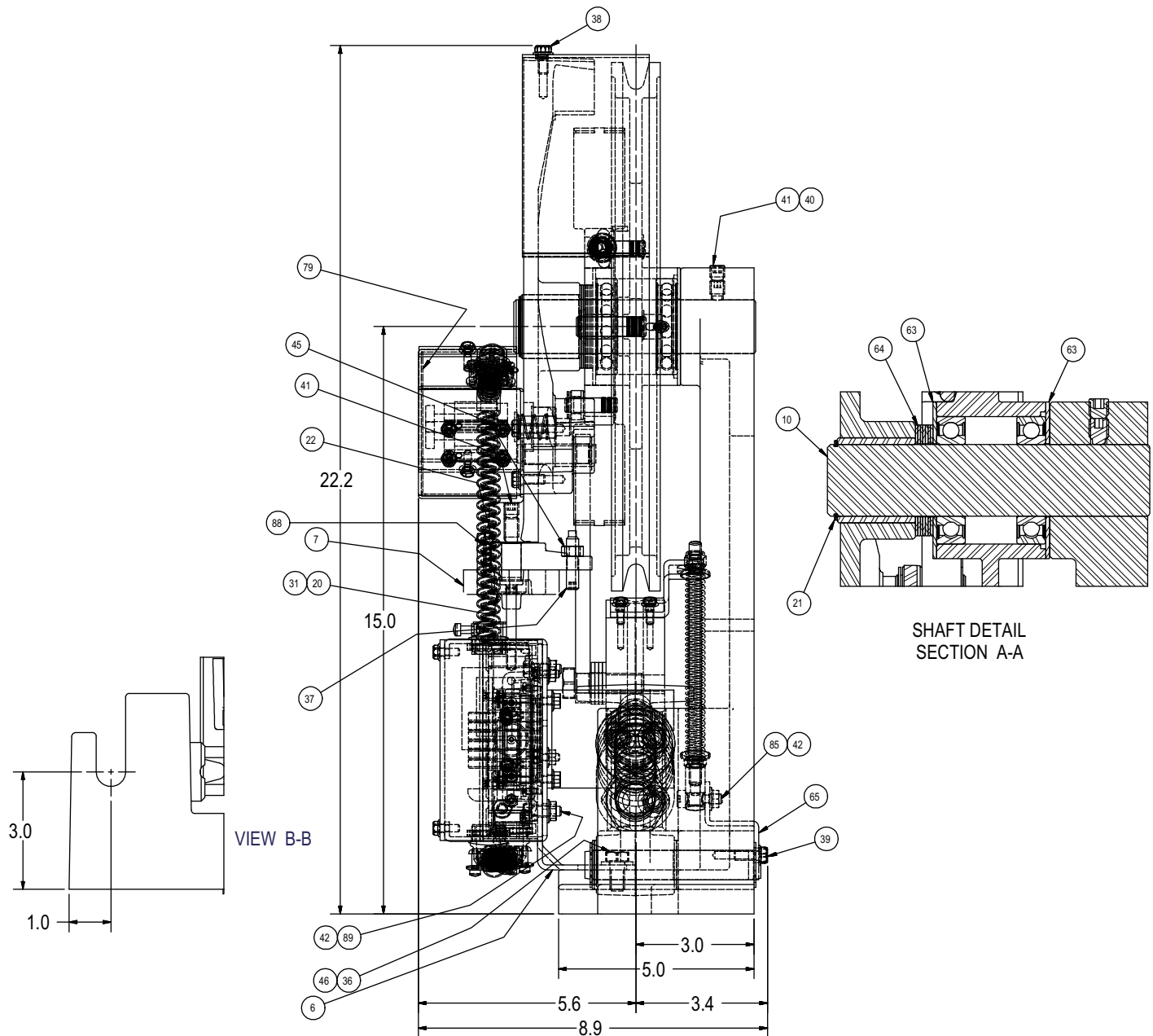


Figure 3.34 HW207 RS Parts List

ITEM	PART #	NO. REQ'D	DESCRIPTION
1	207 - 001-RS	1	Governor Base - Resetting
2	207 - 037	1	Governor Sheave, 0.375" Cable
3	205 - 003	1	Pawl (Weight)
	205 - 003A	1	Pawl (Weight)
4	207 - 051	1	Yoke Assembly
5	207 - 005-RS	1	Head - Resetting Hammer (0.375" Cable)
6	201 - 007-RS	1	Bracket - Speed Switch
7	201 - 009-RS	1	Trigger - Resetting Speed Switch
8	205 - 011	1	Guard - Sheave
9	205 - 012	1	Grip (0.375" Cable)
10	201 - 014	1	Main Shaft - Standard
11	201 - 016	1	Pin (0.75") - Hammer Pivot
12	205 - 017	1	Pin (0.50") - Hammer Link
13	205 - 018	1	Link - Pawl
14	201 - 019	1	Link - Hammer
15	205 - 020	3	Washer, Cup - Spring Retainer
16	205 - 021	3	Pin (0.375") - Pawl
17	205 - 022	2	Pin (0.50") - Pawl Pivot
18	201 - 023-RS	1	Switch - Resetting Speed
19	205 - 024	1	Eyebolt
20	201 - 027	1	Screw - Socket Head Shoulder (0.5 x 1.0)
21	201 - 029	1	Retaining Ring, Smalley #WSM-137
22	201 - 030	3	Washer - Bowed (Hubbard)
23	201 - 032	2	Dust Cap
24	205 - 036	2	Bushing - Nylon
25	207 - 039	1	Hammer Pivot Assembly
26	201 - 041	6	E-ring - Truarc (#5133-50)
27	201 - 042	6	E-ring - Truarc (#5133-37)
28	205 - 059	1	Cork/Rubber Pad
29	90 - 033	2	E-ring - Truarc (#X-5133-74)
30	90 - 034	As Nec.	Washer - Spacer (0.75")
31	460 - 034	As Nec.	Washer - Spacer (0.50")
33	400 - 014	1	Spring - 175 to 225 fpm - Trip
	400 - 013	1	Spring - 226 to 308 fpm - Trip
	400 - 025	1	Spring - 309 to 395 fpm - Trip
	400 - 069	1	Spring - 396 to 625 fpm - Trip
34	-	1	Bolt - HexHead (.5 NC x 1.75")
35	-	3	Bolt - HexHead (.375 NC x 1.25")
36	-	2	Bolt - HexHead (.375 NC x .75")
37	-	1	Screw - Full Dog Set (.313 UNF x 1.5")
38	-	2	Bolt - HexHead Whiz (.25 NC x .5")
39	-	4	Bolt - HexHead Whiz (.25 NC x .625")
40	-	1	Screw - Half Dog Set (.375 NC x .375")
41	-	2	Screw - Knurled Cup Set (.375 NC x .375")
42	-	3	Nut - Whiz (.25 NC)
43	-	2	Nut - Jam (.313" NC)
44	-	As Nec.	Washer - 0.5" Standard
45	-	1	Nut - Jam (.313" UNF)
46	-	6	Washer - Standard (.375")
47	-	1	Roll Pin - .188 x 1.5"
48	-	2	Lead Seal
49	-	1	Data Tag
50	-	2	Rivits - Data Tag
61	-	1	Nut - Jam (0.375" NC)
63	201 - 043	2	Washer
64	192 - 006	7	Washer - Spacer
65	207 - 081	1	Bracket - Lower Guide Rod Pivot
66	207 - 082	1	Bracket - Upper Guide Rod
67	207 - 083	1	Guide Rod - Hammer Head Return
68	207 - 084	1	Pivot Base - Hammer Head Spring Guide
69	207 - 086	1	Bracket - Solenoid & Terminal Block
70	207 - 087	1	Reset Solenoid Assembly - Governor
71	207 - 088	1	Cover - Solenoid & Terminal Block Bracket
72	207 - 089	1	Bracket - Remote Trip Solenoid
73	207 - 089-1	1	Cover - Remote Trip Solenoid Bracket
74	207 - 090	1	Pin Guide - Remote Trip
75	207 - 091	1	Pin - Remote Trip
76	207 - 092	1	Solenoid - Remote Trip Pin
77	207 - 093	1	Brace - Switch Bracket
78	207 - 094	1	DIN Rail
79	207 - 095	1	Coil Isolation
80	400 - 079	1	Spring - Hammer Head Return
81	400 - 080	1	Spring - Trip Pin Return
82	GL100 - 159-5	2	Terminal Block End
83	GL100 - 159-7	6	Terminal Block
85	-	1	5/16 x 0.5 Socket Head Shoulder Bolt
86	-	1	5/16 UNC Jam Nut
87	-	1	5/16 UNC Nylock Nut
88	-	2	3/16 x 0.75" Roll Pin
89	-	2	Whiz Bolt 0.25x20-0.75
90	-	10	#10-24 x 0.5 Whiz Bolt
91	-	2	#10-24 x 0.5 RHMS
92	-	6	#10-24 Whiz Nut
93	-	4	#6-32 x 0.375 RHMS
94	-	4	#6-32 Nylock Nut
95	-	1	3/8 Box Connector 501-DC2
96	-	3	3/8 90° Angle Box Connector 801-DC2
97	-	1	3/8 Flex Conduit (6.5 or 11")
98	-	1	3/8 Flex Conduit (5")
	460 - 036	As Nec.	Washer - Spacer (0.375")

Counterweight Governor Installation

If floors below the elevator are occupied, a counterweight governor may be required. Refer to the MCE construction drawings.

The counterweight and car governors and tension weight/sheaves are clearly labeled to prevent confusion as to their intended locations and uses. Refer to the controller job prints for wiring information. As with the car governor, **counterweight governor rope should never be lubricated.**

The geometry of the installation will dictate the mounting location of the counterweight governor. It may be mounted on a beam in the overhead, on the floor in the machine room, or, in unusual cases, on a mount clamped to a counterweight guide rail. The construction drawings for the installation will clearly indicate where the governor mounts for any particular installation.

Switches

If hoistway wiring is in place, connect the governor and tensioner (if required) switches into the controller safety string as shown in the controller job prints. If so equipped (MRL), the remote governor set and reset switches should also be connected at this point. Both switches operate on 120VAC.

About the Governor Switches

Governor Set Switch Pressing the governor Set or Test button provides voltage to the set solenoid mounted on the governor. In order for the governor to set, the car must be running and the switch must be held until the governor sets.

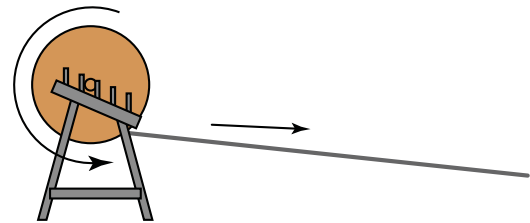
Governor Overspeed Switch The governor overspeed switch is adjusted to actuate at approximately 90% of the governor mechanical tripping speed. The switch is wired into the safety string so that, when actuated, power will be removed from the machine and the brake bringing the car to an immediate stop. Refer to the controller job prints.

Switch Reset Refer to the controller drawings for wiring instructions. When the Reset button is pressed, depending upon switch state, the switch will reset. Alternately, the switch may be manually reset at the governor.

Job Prints The controller job prints for the installation will detail switch wiring for each specific job.

Governor Roping

Governor rope (3/8" traction steel, right regular lay) is cut to the correct length and provided to you on a spool. Rope must be properly and carefully handled. In addition to avoiding damage and dirt, you must also remove the rope from the spools properly to avoid kinking.



Generally:

- Raise the reel so it can be easily rotated.
- Have one person walk the rope away from the reel while a second person keeps enough tension on the reel to prevent slack in the rope.
- Uncoil the entire length of rope and allow it to lay in a straight line.
- When rope is laid over a sheave, it should bend in the same manner as when originally wound.

Rope must never be dragged over an edge, corner, or dirty floor.

- **NEVER** lubricate governor rope.

Safety Adjustment

**Caution**

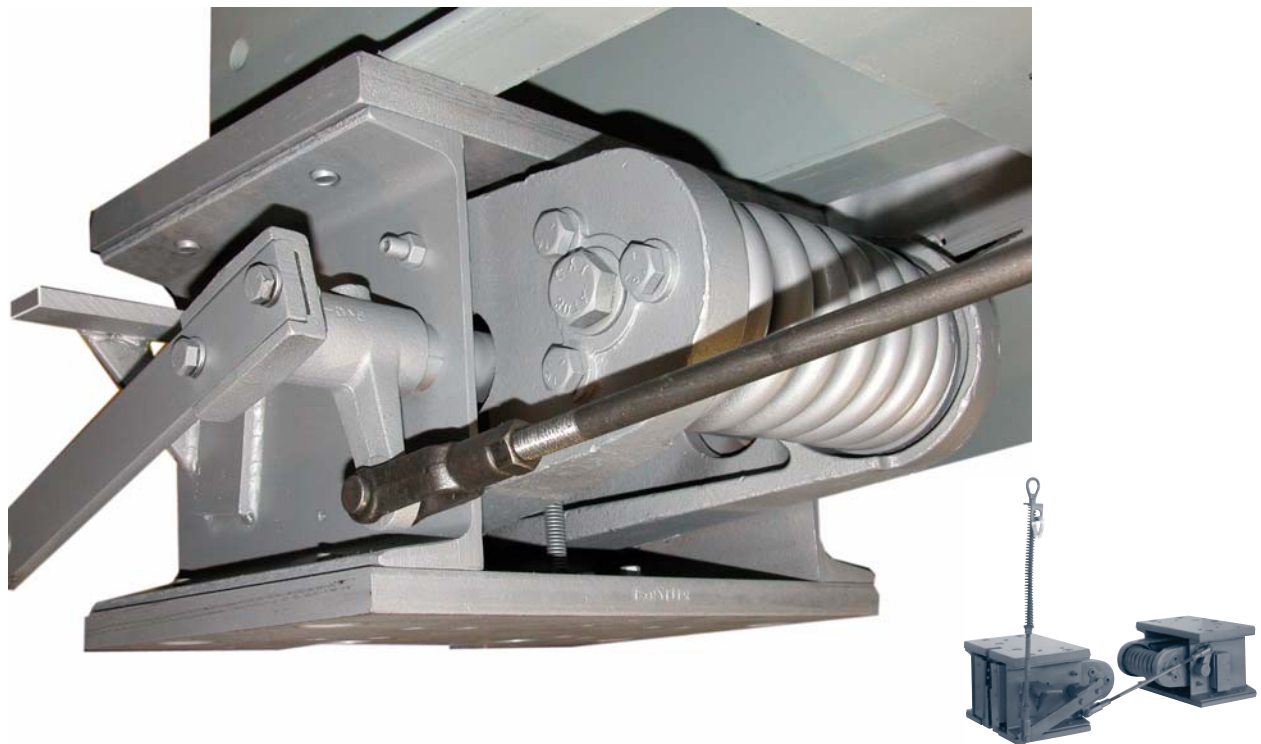
Guide rail faces must be clean, free of oil, paint, rust, or other contaminants. This is **EXTREMELY** important.

Safeties are installed on the bottom of the safety plank and coupled together at the factory. Safety plank/safeties and sheave plank/sheaves are shipped as a unit. Centering, setback, safety-to-safety relating linkage, and stopping pressure (slide distance) are all adjustable in the field if necessary.

**Danger**

Safeties must be properly adjusted to ensure they will function as required in emergencies.

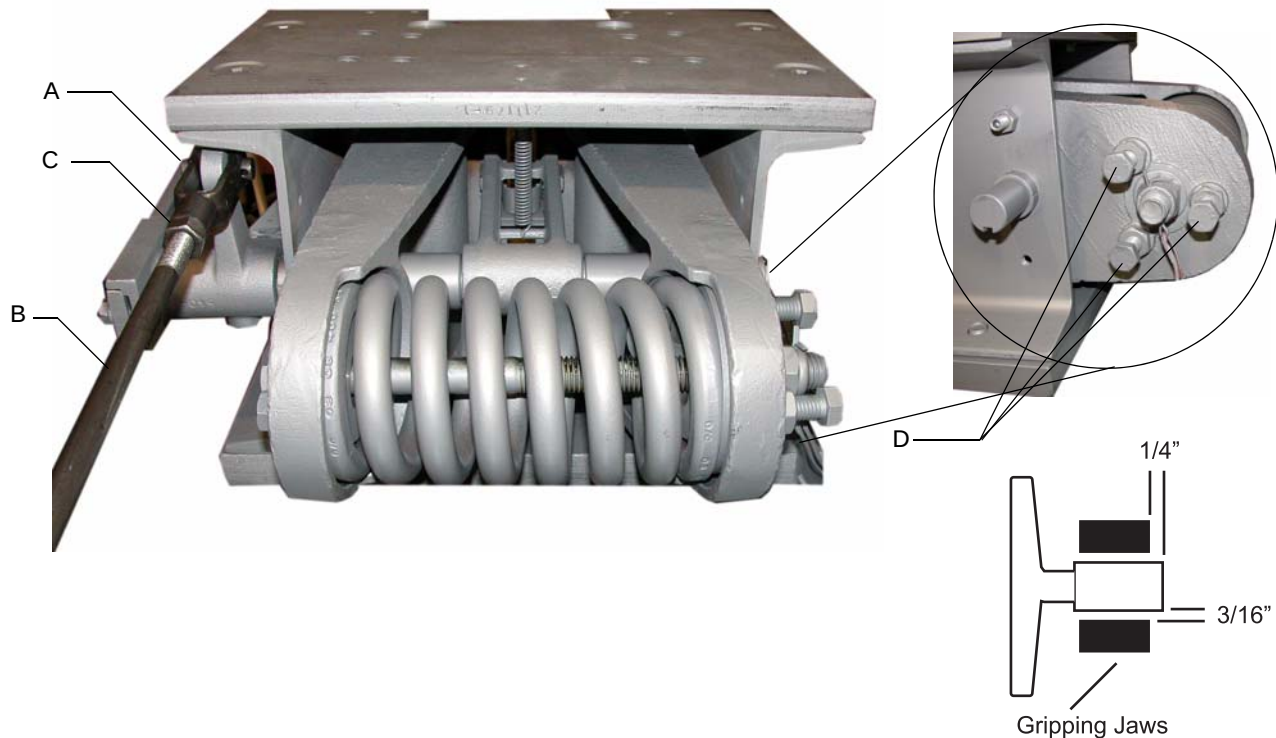
Figure 3.35 Hollister Whitney Type B Flexible Guide Clamp Safeties



The safety is preset to provide 3/16" clearance between the safety jaws and the side surface of the rail blade. The safety is also adjusted to provide the designated slide distance in accordance with A17.1/CSAB44 requirements. However, actual field conditions and variation in car weights and configuration may require that the safeties be readjusted in the field. If so, please consult your MCE project manager.

With the safeties properly installed on the safety plank, there should be 3/16" clearance between the safety jaws and the side surface of the rail blade on each side. The inside edge of the grip should be about 1/4" back from the face of the rail.

Figure 3.36 Safety Adjustment



1. Raise the safety lever (A), observing the braking surfaces of the safeties. Each gripping surface on both safeties **must engage the rail at the same moment**. If not:
 - Loosen nut(s) (C) and adjust effective length of relating rod (B). Retighten nuts.

Safety Test

When installation progress allows, test safety operation at inspection and governor tripping speeds:

1. Check the level of the platform.
2. With the car running at Inspection speed, set the safeties. After observing loss of traction, remove power from machine and brake.
3. Check the level of the platform. (If any "racking" is detected [caused by non simultaneous safety setting], you will need to readjust safeties to assure all gripping jaws contact rails simultaneously and re-test.)
4. Run the car up on inspection to reset the safeties. Reset the governor by hand or using the switch in the controller.

Tripping Speed Test the safeties at mechanical tripping speed when conditions allow. Conduct this test as directed in the manual for the elevator controller. Additionally:

1. Check the level of the platform. As before, if any racking is detected, you will need to readjust the safeties.
2. Check slide distance. (See ASME/CSA code for guidance in properly measuring slide distances.) If slide distance is not correct:
 - Carefully and **equally** adjust spring tension in small increments using adjusting bolts (D). (Tighten to shorten slide; loosen to lengthen slide.) Note that each adjusting bolt has a locking nut at its base that must be loosened to adjust the bolt.
 - When adjustment is complete and the locking nuts of the adjusting bolts (D) have been secured, make certain that the distance between the underside of the adjustment bolt (D) heads and the top of the locking nuts are equal. (Ensures adjustment is equal for all three adjusting bolts.)

Table 3.5 Flexible Guide Clamp Safeties Slide Distances

Speed FPM	Maximum Tripping Speed FPM	Minimum Stopping Distance	Maximum Stopping Distance
200	280	4 inches	22 inches
350	452	10 inches	40 inches
500	625	20 inches	68 inches

Note

Slide distances can vary depending on final cab weight, guide rail composition, and safety jaw variables. Field adjustment may well be necessary.

When using the table above, subtract the length of the safety shoe from the measured slide mark to determine the actual slide distance. Use the average of the four (4) slide marks to record the slide distance.

Type A Safeties

Type A safeties are only used on low speed cars. Install Type A safeties as described for Type B safeties. Jaw pressure is not adjustable but you may need to adjust the length of the relating rod to ensure that the jaws of both safeties engage the guide rail at the same moment. This will be very important to avoid platform racking because Type A safeties do not allow the car to slide, instead they stop it immediately.

Temporary Run Box

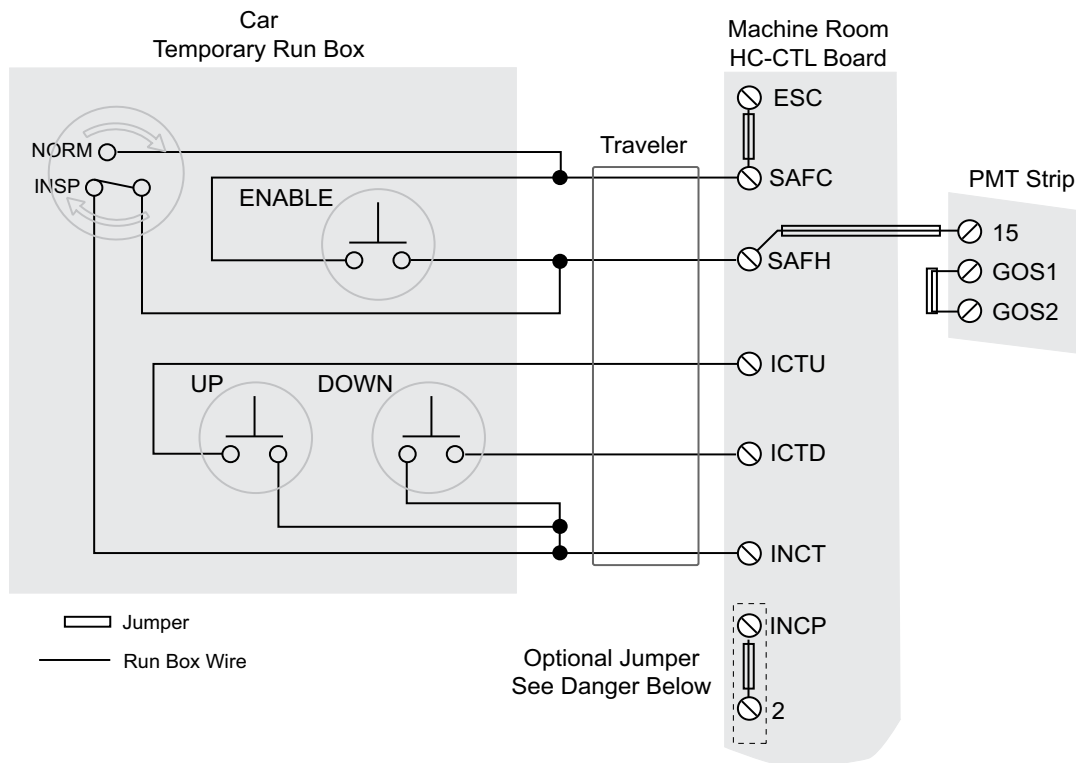
If it is necessary to use a temporary run box to run the platform during construction, the following illustration shows the required connections for the Motion 4000 controller. Include safety string elements already installed. Refer to the iControl manual for information about wiring a temporary run box for that controller.



Caution

For safety, keep the controller Machine Room Inspection switch in the INSP position while the temporary run box is in use. If a jumper was installed between HC-CTL board terminals SAFC and SAFH, it must be removed when the temporary run box is connected.

Figure 3.37 Temporary Run Box



Danger

Wire the temporary run box as shown for safe operation. The jumper from 2 bus to INCP prevents the car from reverting to Normal mode if/when there is a loss of connection to INCT. Machine Room Inspection operation is prevented until the INCP/2 Bus jumper is removed. It is imperative that any temporary jumper installed in the controller be removed as soon as the equipment wiring it is simulating is in place. Temporary jumpers or wires may not be stored in the control room or space.

Traveler and Hoistway Cables

The hoistway cable is a bundle of electrical conductors bound together using a string or web wrap to facilitate easier wire pulling through conduit and easier lay-up in troughs. The hoistway cable originates at the elevator controller and connects to fixtures, the hoistway safety string, and other fixed components in the hoistway. Spare conductors are provided as specified.

The traveler cable (a bundle of electrical conductors packed together inside a heavy vinyl jacket for protection) carries information and power to/from the elevator car. Freedom elevator packages include special, pre-labeled traveler cable for Motion 4000 or iControl installations. Spare conductors are provided as specified.

Handling

Traveler and hoistway cable must be handled properly to avoid damage.

- When moving a reel of cable with a forklift, never allow the cable to contact a fork. Lift only on the reel itself.
- Store in a clean, dry area.
- Seal open cable ends with electrical tape.
- Never use cable that appears to be damaged without first contacting MCE.

Hoistway Cable

- Install junction and fixture boxes as shown in the drawings package.
- Install trough as shown in the MCE construction drawings. Install conduit and wiring bundles per best practices and local requirements.

Round Traveler

¹Before installing round traveler, you should strip the appropriate length, usually 6-feet, at the controller end and then hang the cable in the hoistway to allow it to relieve stresses caused by reeling and handling.

Stripping

1. Carefully measure and mark the stripping point.
2. Use a tool like the ¹Draka Flexi-Peeler™ to score the full diameter of the cable at the stripping point. Next, turn the handle of the tool 90-degrees, slit the jacket to the cable end, and peel it away.
3. With the braid exposed, use a tool like the Draka Sock Slicer™ to expose the wires.



Caution

Never use a knife or scissors to remove the braid. Doing so can easily damage the conductors.

4. Separate the conductors by layer and carefully remove all the jute fillers.

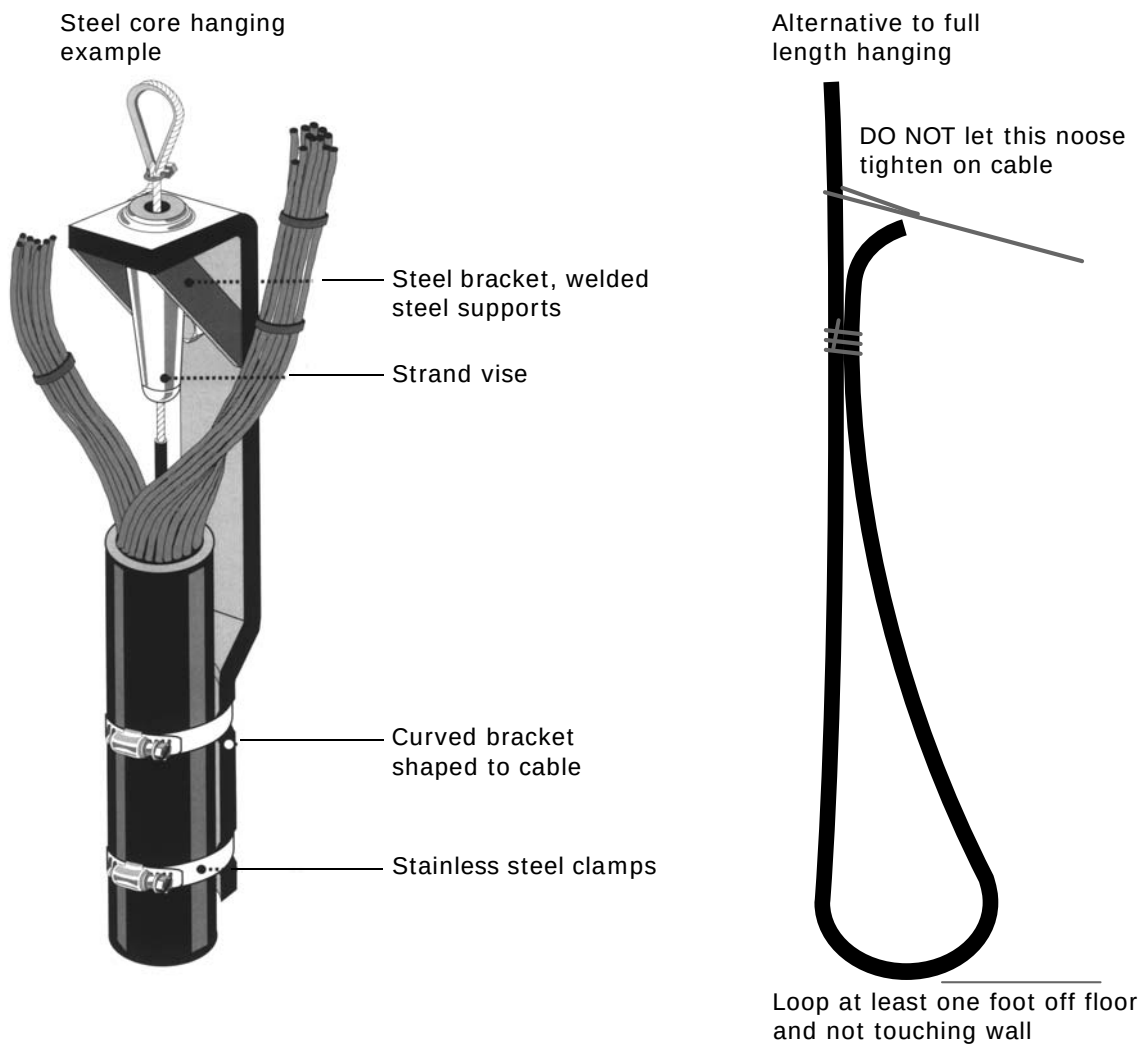
1. Information and some illustrations courtesy of Draka Elevator Products, Inc.

Pre-Hanging

Pre-hanging is an important step. It allows the traveler to relax and straighten.

1. Choose a solid anchor point, high enough to allow the entire length of cable to be hung in the hoistway without contacting the pit floor. (If this is not possible, excess cable may be looped back up and attached to the initial cable drop. The important thing is to suspend the full weight of the cable.)
2. For steel core cables, we provide the Draka Universal Hanger. Always secure the weight load in the strand vise of the hanger first, then tighten the hose clamps. This prevents cable rotation or conductor layer slippage.
3. For jute-core cables, use the appropriately sized mesh grip provided in the MCE elevator package.
4. The cable end (or loop) should clear the pit floor by at least one foot to allow room for straightening. The cable should be hung for a minimum of 24 hours.

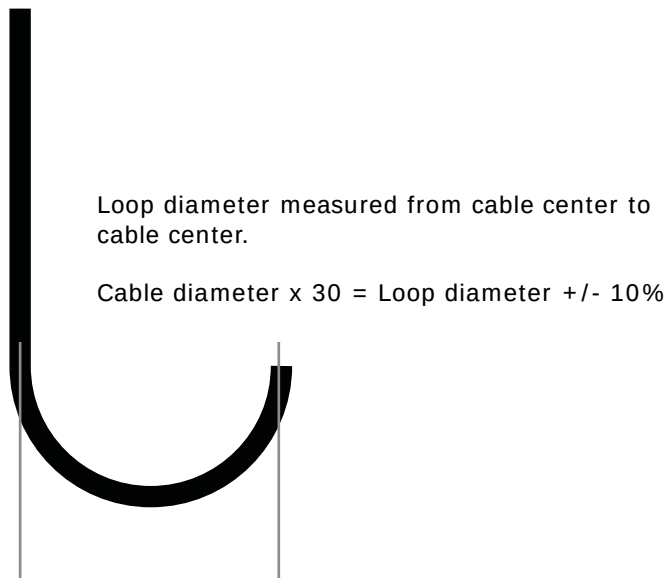
Figure 3.38 Pre-hanging Round Traveler Cable



Cable Loop When Hanging

When installing the traveler, be careful not to twist or rotate the cable. This helps ensure smooth operation and a hanging cable that does not twist. It is also important that the loop of cable under the car is properly sized. It should be equal to the diameter of the traveler multiplied by 30 (thirty) to within 10%. For example, 1 1/2" diameter cable multiplied by 30 would indicate a loop diameter of 45 inches, plus or minus 10%.

Figure 3.39 Round Traveler Loop Diameter

**Car-End Connections**

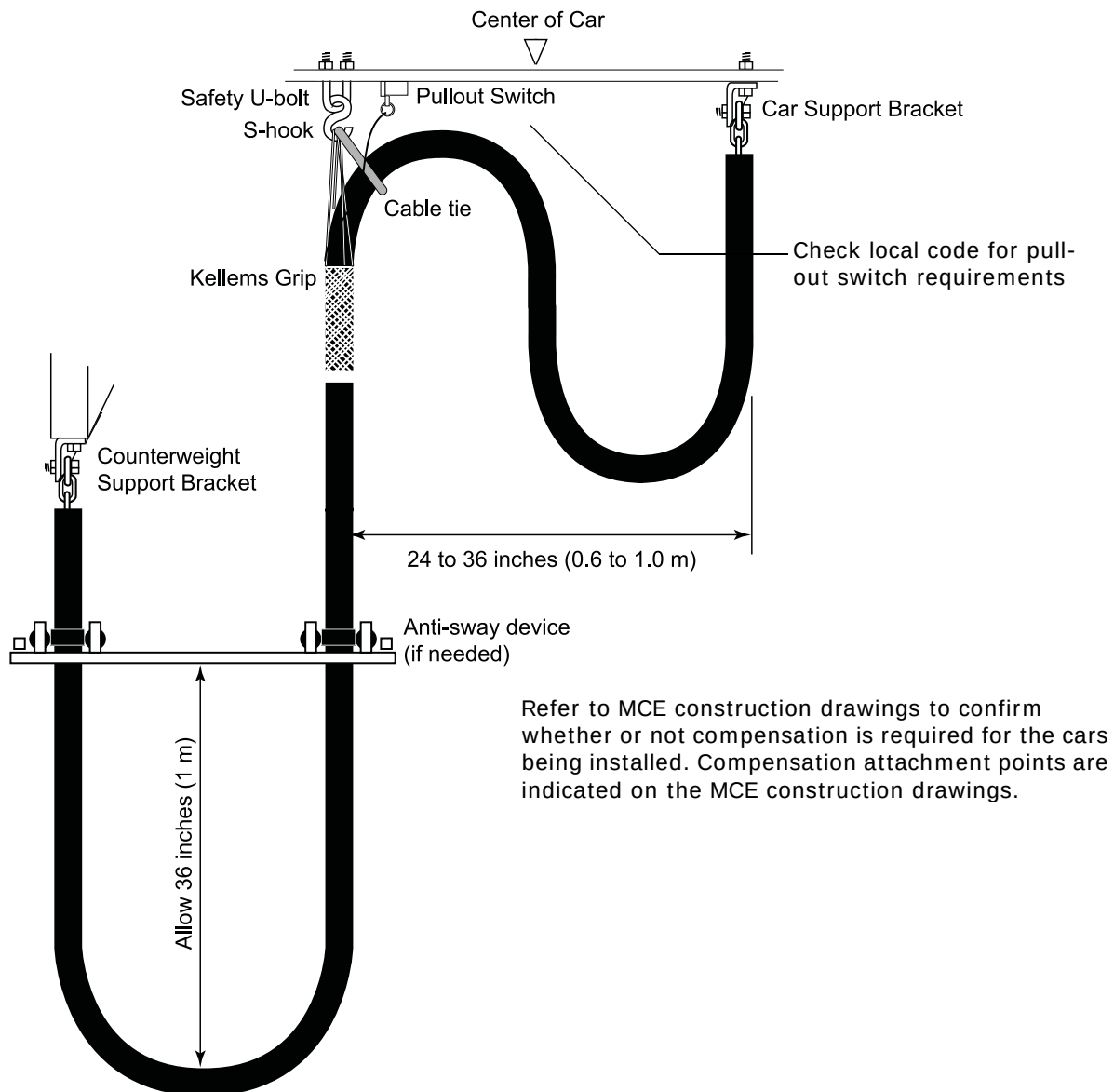
Refer to MCE construction drawings for mechanical attachment and routing for the cable bundle. Refer to controller job prints for wiring information.

Compensation

Compensation may be required on the installation to offset rope mass. MCE packages use compensating cable consisting of low carbon, electrically welded chain, surrounded by a metallic bead, polyvinyl chloride mixture, inside a flame retardant PVC jacket that resists oxidation, weathering, solvent, and other chemicals.

- Anti-sway devices may be necessary at speeds above 350 FPM (1.8 m/s).
- Hardware (U-bolts, S-hooks, etc.) are specially designed and rated to withstand hanging weights and movement. Standard hardware may NOT be used.

Figure 3.40 Compensation Chain, Typical Installation



Balancing the Car

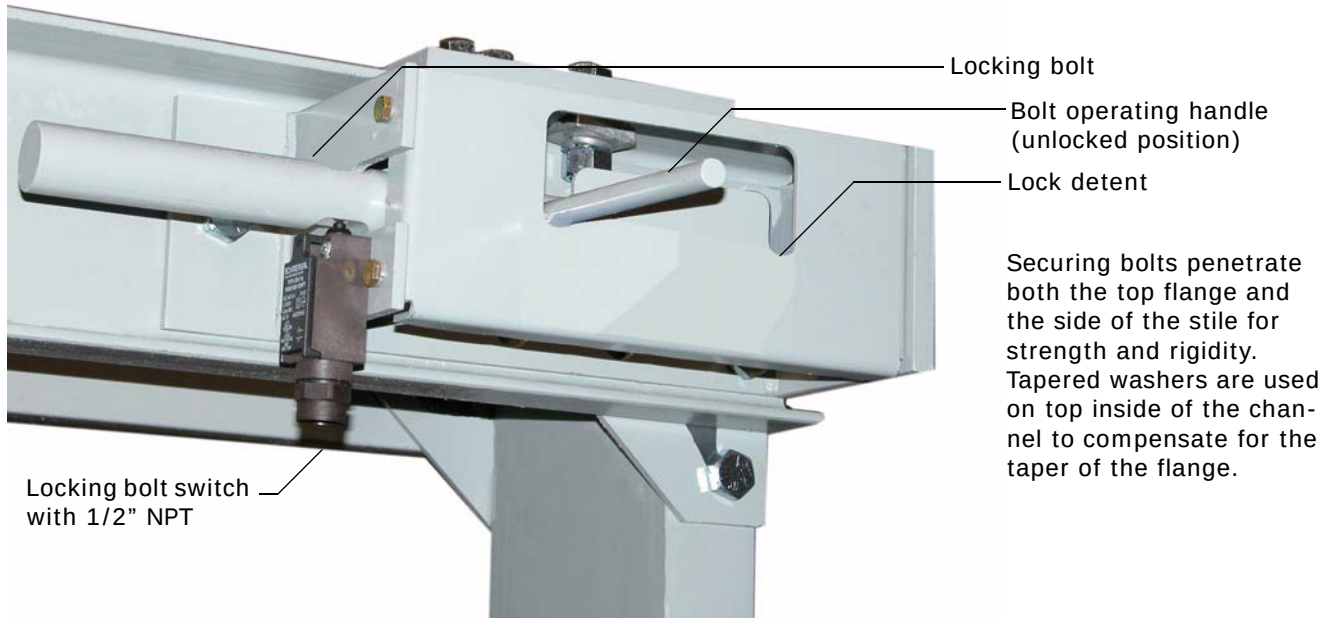
Hoistway machine performance is specified to a particular load (car equipment and passengers) and to a specified offset to the load through counterweighting. Balancing the car is important to performance and ride characteristics.

1. Place a balanced load in the car (specified percentage of full load; typically 40% but sometimes 45 or 50%).
2. On Machine Room Inspection, run the car to the middle of the hoistway (position may be learned by performing a counterweight learn procedure).
3. Turn controller power OFF.
4. Use a portable supply to inject sufficient DC voltage at controller terminals B1 and B2 to lift the brake. (Or, manually lift the brake.)
5. Watch the car to see if it drifts. If not, the car and counterweight are balanced.
 - If the car drifts up, remove weight from the counterweight or add weight to the car and repeat the balancing procedure.
 - If the car drifts down, add weight to the counterweight or remove weight from the car and repeat the balancing procedure.
6. When car and counterweight are balanced, record the actual weight in the car for future reference. Balanced load = _____lbs.
7. Restore controller power.

Car Top Locking Bolt, MRL Applications

The slide/lock bolt assembly is mounted on the crosshead of the car sling before shipment. You will need to mount the receiver plate on the guide rail and wire the bolt position switch into the safety string as shown in the controller job prints.

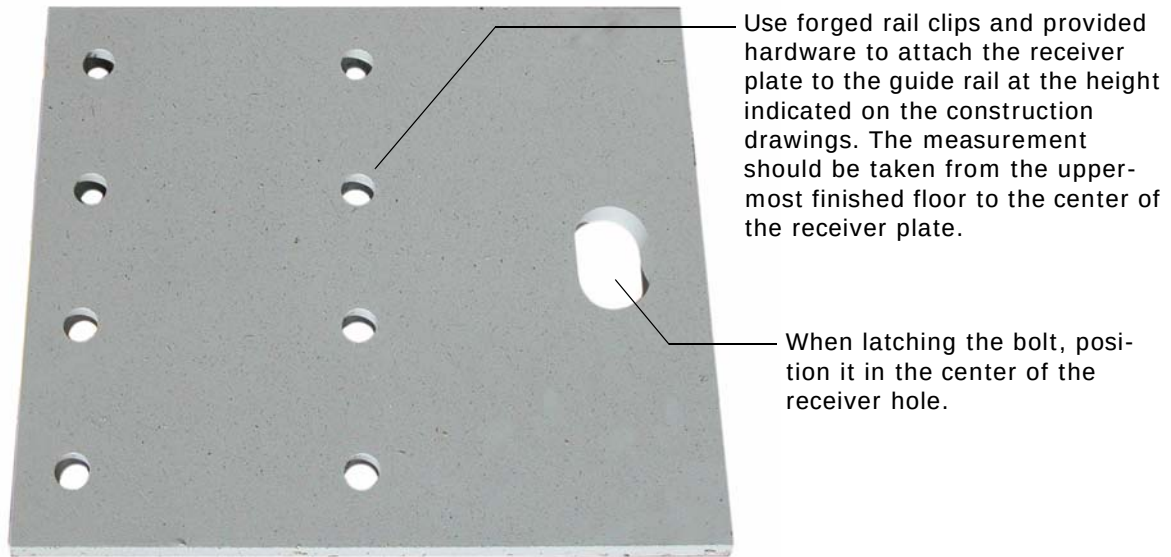
Figure 3.41 Car Top Blocking Device



Danger

The car top locking bolt is only intended for use with suspension ropes in place. It is NOT intended to support the car without suspension means in place and may not be used to support the car for roping.

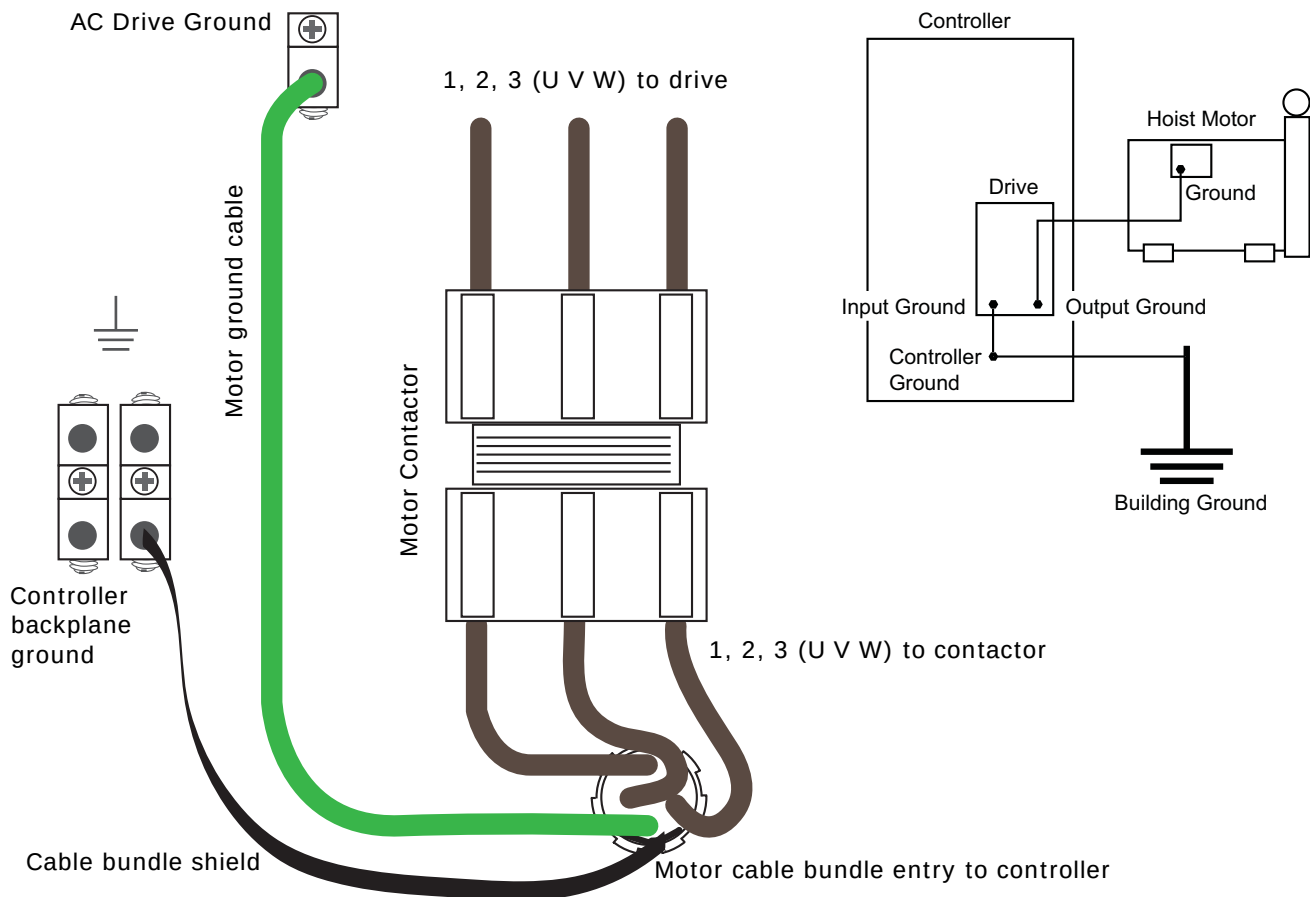
Figure 3.42 Locking Device Lock Plate



Elevator Controller, Drive, and ISO Transformer

The elevator controller is generally installed in a control room or closet. Install the controller as shown in the MCE construction drawings and the controller job prints. The cables from the drive to the machine should be kept as short as possible. A special VFD cable is provided with every Freedom Elevator. If the cable exceeds forty feet (12 meters) in length, refer to the drive manual to see if any special filtering will be required. MCE VFD engineered, shielded cable is connected inside the controller as shown below. Once the O.D. of the cable is determined, MCE can advise you as to conduit size and bend radius.

Figure 3.43 Motor Cable Connections Inside Controller



- Motor cable bundle ground cable (green) connects to the ground on the drive
- Cable bundle shield connects to nearest ground on the controller backplane
- Cable bundle shield must be trimmed back to insulation (left unconnected) at motor end

Cable Routing

High voltage cables and encoder cables must be run in separate conduit from one another to prevent electrical noise from being induced in the encoder circuit. We recommend you use oversize (2-inch) conduit to route the encoder cable so that you do not have to remove end connectors (which may void the warranty).

Isolation Transformer (if required)

Install and wire the isolation transformer as shown in the controller prints for the job.



Motion Control Engineering®

A Kinetek Company®

Entrances, Car, and Positioning System

In this section

This section provides installation information for:

- Hall Entrances and Doors [4-2 ->](#)
- Elevator cab assembly [4-23 ->](#)
- Cartop hand rail [4-45 ->](#)
- Cartop Station [4-45 ->](#)
- Doors and Hatch Door Equipment [4-47 ->](#)
- Hall Stations [4-47 ->](#)
- Car Operating Panel [4-47 ->](#)
- Rescue Assist System [4-48 ->](#)

Note

Entrances, car doors, and cab assembly information in this section relate to the units typically used in MCE packages. Occasionally, job specifications require that different entrances, doors, or cab assemblies be used. In these cases, the installation drawings will provide accurate information. In all instances, installation drawings are the controlling documents and should be followed if any question arises.

Hall Entrances and Doors

If you are using the car as a “sill template”, the guide rails must be properly aligned so that there is no variation in vertical and horizontal plumb and sill runby as the car moves through the hoistway. The elevator cab is generally assembled on the platform before the lower entrance is completed. [Please refer to “Cab Assembly” on page 4-23.](#)

MCE routinely uses Swiss Dane or National entrances and doors.

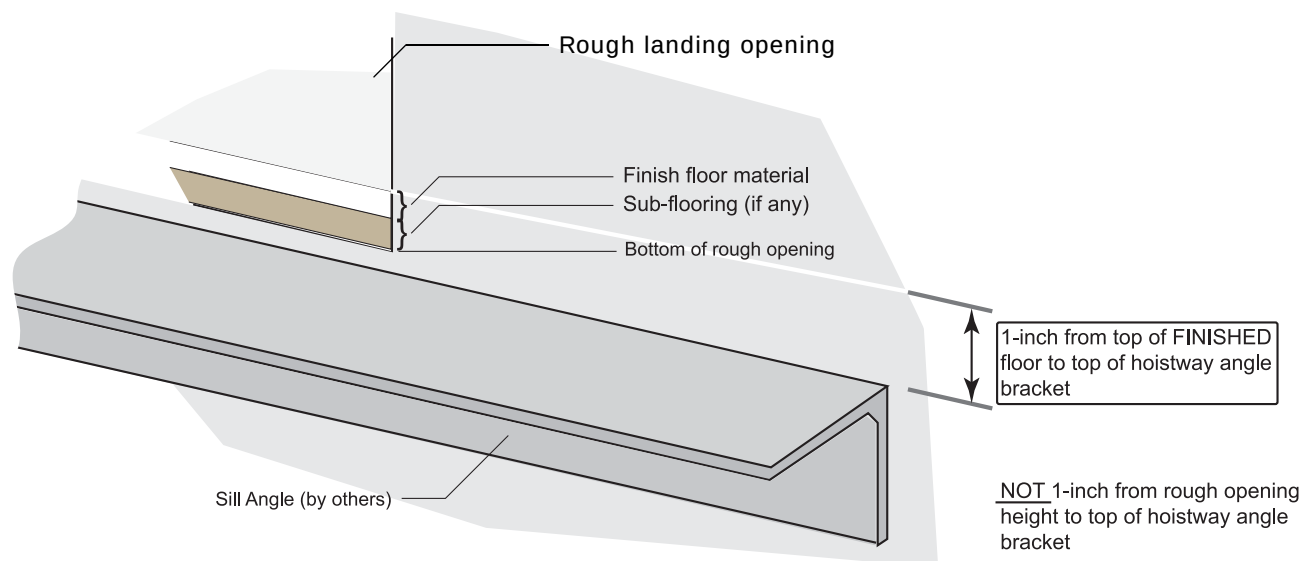
Drawings

Approved construction drawings detailing landing entrance construction and car sill requirements are provided and are the controlling installation documents. If there are differences between the manual and the construction drawing, the construction drawing supersedes the manual.

Swiss Dane Entrances

¹These instructions assume that proper sill angles have been attached in the hoistway below hoistway openings by the general contractor per requirements. For MCE standard sills, sill angle is installed one-inch below FINISHED floor height. See below.

Figure 4.1 Hoistway Sill Angles Installed 1-inch Below FINISHED Floor



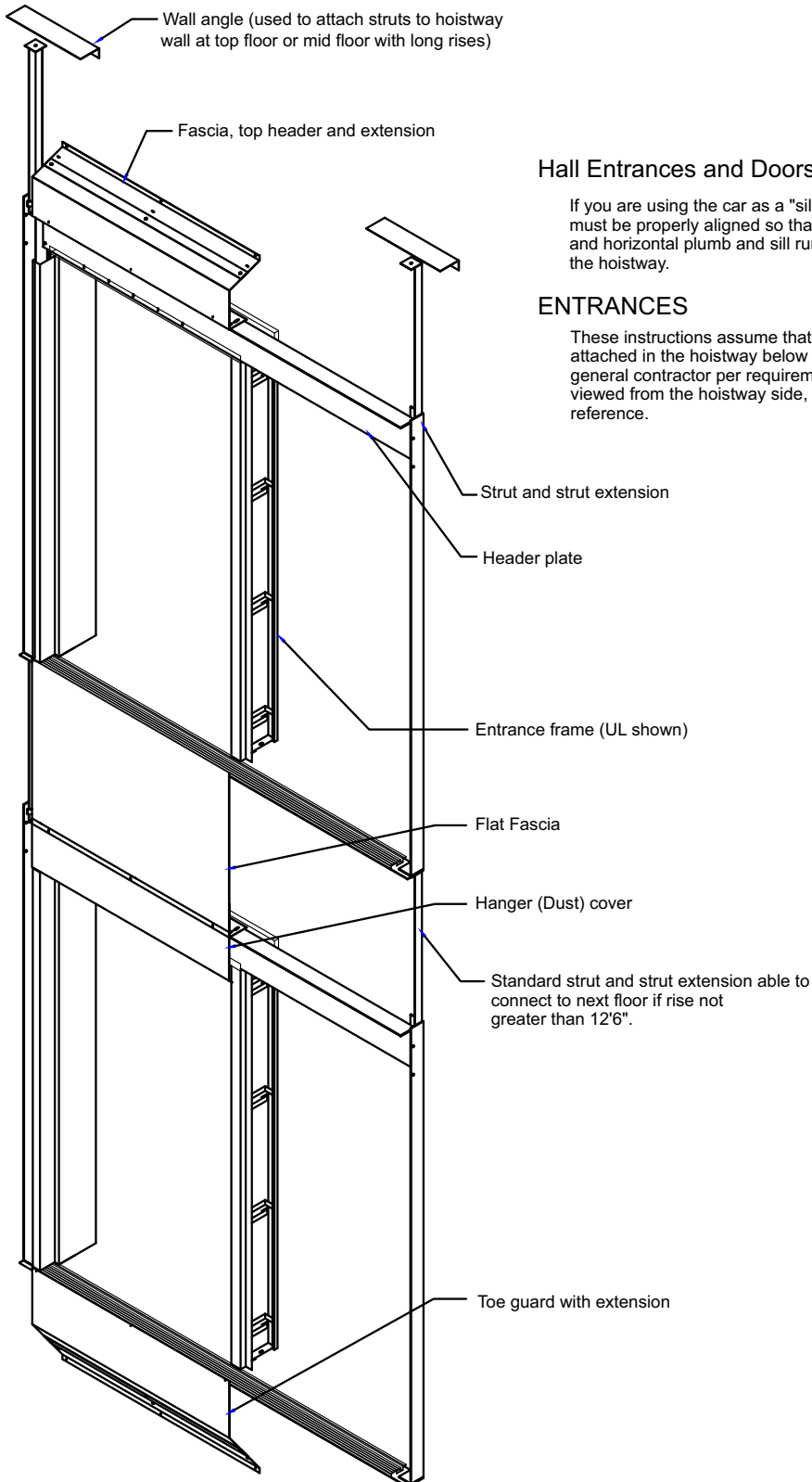
Note

Not all jobs are standard sills. The approved construction drawings are the controlling document to which all hoistway work must conform.

1. The most commonly used MCE entrances are described in this section. Depending upon requirements, different entries may be used. In all cases, construction drawings are provided and are always the governing document should there be any question about installation or materials.

A complete entrance, viewed from the hoistway side, is shown below for reference.

Figure 4.2 Hoistway Entrance Example



Hall Entrances and Doors

If you are using the car as a "sill template", the guide rails must be properly aligned so that there is no variation in vertical and horizontal plumb and sill runby as the car moves through the hoistway.

ENTRANCES

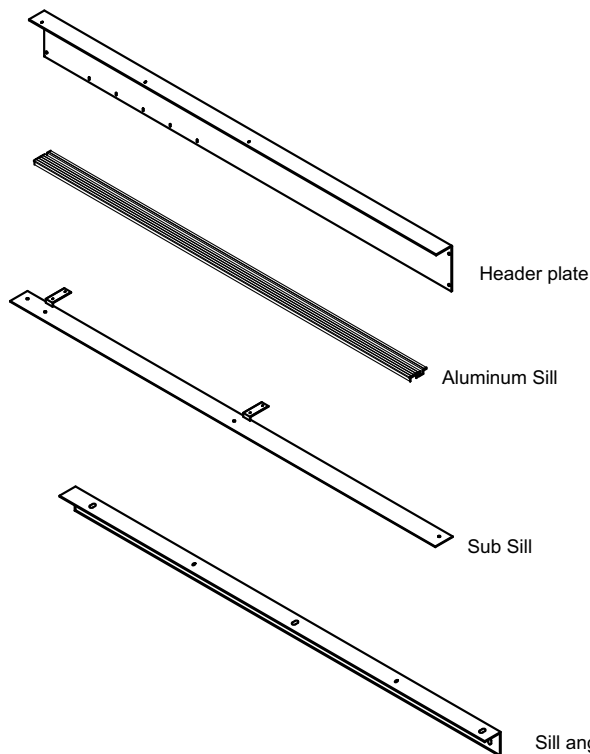
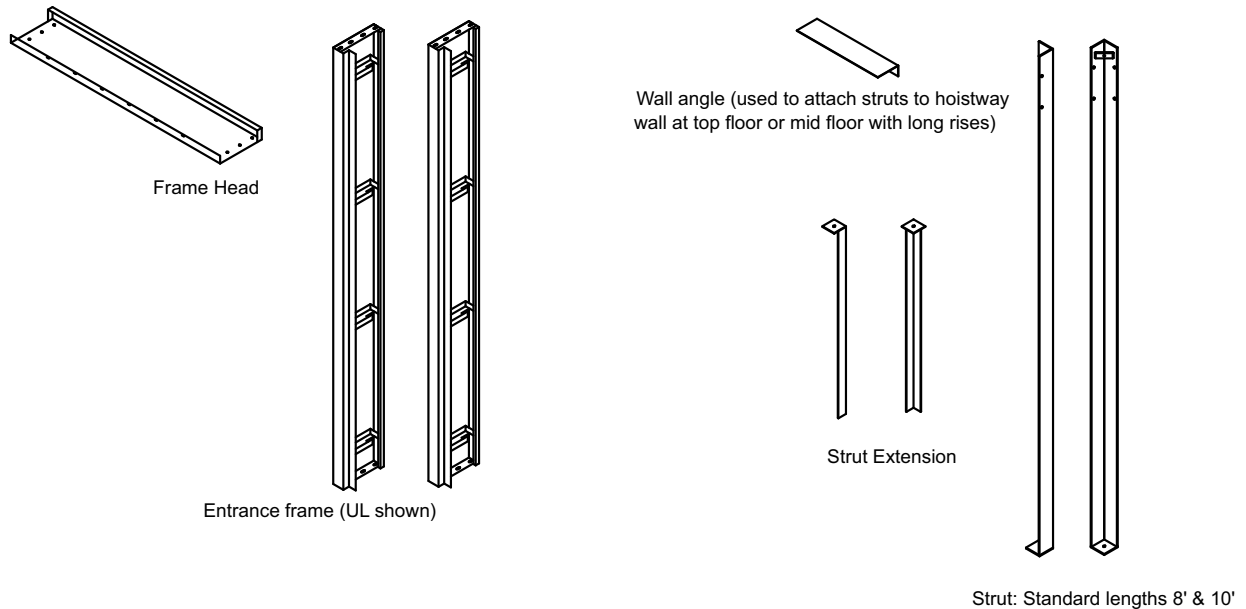
These instructions assume that proper sill angles have been attached in the hoistway below hoistway openings by the general contractor per requirements. A complete entrance, viewed from the hoistway side, is shown on this page for reference.

Packaging

Typical “rough package” parts complement shown below.

Figure 4.3 Rough Package Parts

Rough Package Parts



STANDARD PACKING

Frame sides for each entrance boxed.
Frame heads may be packed together depending on width of frame.

Struts, Strut Extensions and Wall angles banded together. Each bundle may hold up to 6 floors.

Header Plate, Sub Sill and Sill banded together. Each bundle may hold up to 6 entrances.

HARDWARE SCHEDULE:

Packet for each Frame Assembly
Packed in box with Frames

12- 1/4-20 x 3/4" Bolts

12- 1/4-20 Nuts

6- Tex Screws

Packet for each Landing
Packed with each set of struts and extensions

2- 3/8 x 2" Bolts

4- 3/8 x 1" Bolts

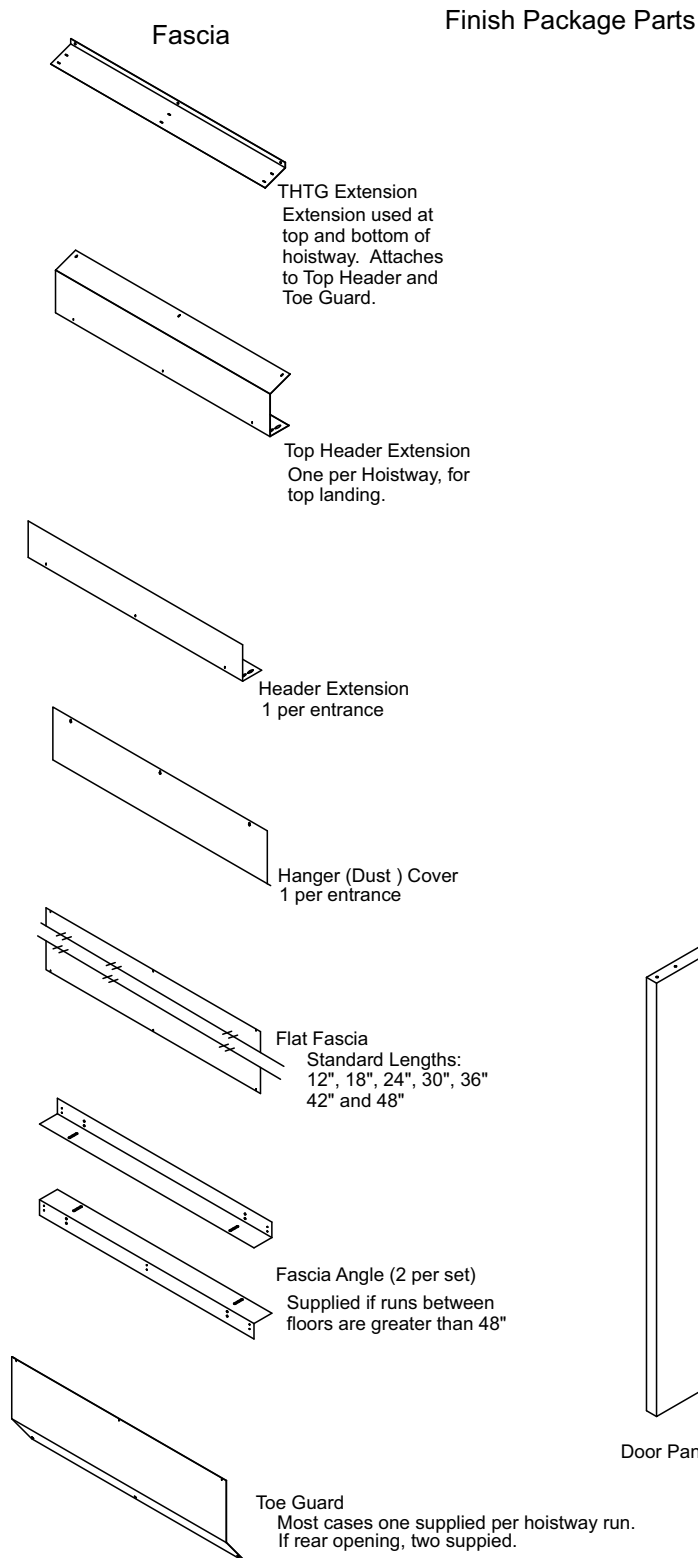
7- 3/8 x 1-1/4" Bolts

13- 3/8" Nuts

If Sill angles ordered; in most cases they will be banded together in separate bundle.

Typical “finish package” parts complement shown below.

Figure 4.4 Finish Package Parts



STANDARD PACKING

Formed and Flat fascia up to 18" long are boxed along with hardware.
Flat fascia longer than 18" may be banded to a skid or packed in crate depending upon amount required.

HARDWARE SCHEDULE: Shipped in box with formed fascia

Hoistway Pack Hardware (Double if hoistway has rear opening)
4- 1/4 x 1" Tap-Ins (Nail with Nylon Cover)

Finish Pack Hardware (Items listed supplied for each opening)

3- 3/8 x 1" Bolts

3- 3/8" Nuts

10- Tex Screws

3- 10-3/2 x 1/2" Screw

3- 10-3/2 Nuts

Hardware Pack Fascia (Items listed supplied for each set of Fascia angle supplied)

2- 3/8 x 1" Bolts

2- 3/8" Nuts

6- Tex Screws

2- 1/4 x 1" Tap-Ins

Sight Guard attachment:

7- Tex Screws

Door Gibs:

2 Per door panel (packed with attaching hardware)

Door fire Tab:

1 Per door panel

Door Bumpers: (1 set per side opening entrance)

2- Rubber bumpers with 3/8" Nuts (set)

To be attached to Frame Step in holes pre-punched

(If entrance is center opening, doors supplied with astragal)

Entrance Sills

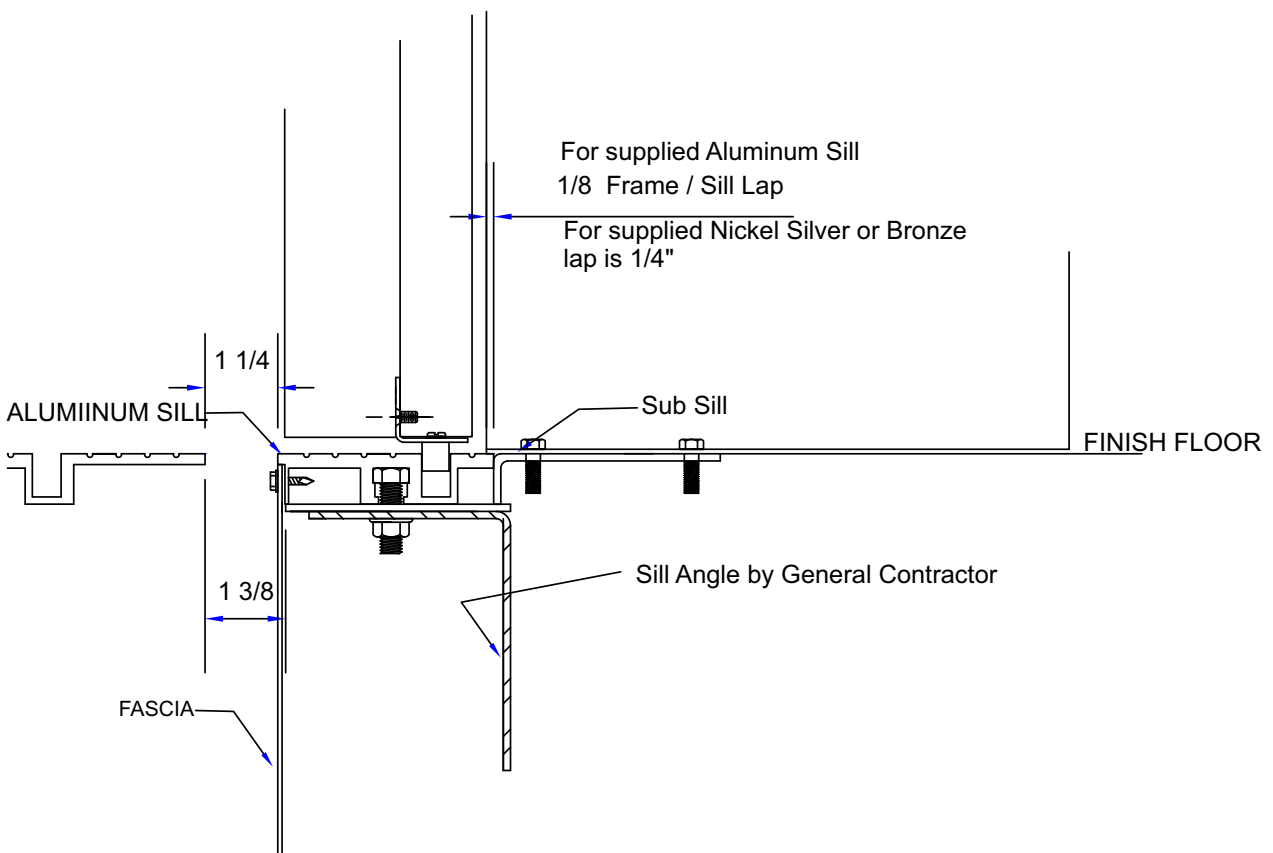
Refer to the drawing below:

Figure 4.5 Fitting Entrance Sills

Sills

Refer to the drawing below while following the numbered steps.

1. Set sub sill level in all directions with top surface depth exactly 1.0" below finish floor height.
2. Align the hoistway edge of the sub sill so that there is 1-3/8" gap between that edge and the edge of the car sill all the way across the opening.
3. Center the sub sill in proper alignment with the car sill.
4. Clamp the sub sill in place and, using the holes in the sub sill as guides, drill mounting holes through the hoistway angle with 7/16" drill bit.
5. Mark the center of the sill.
6. Slide 3/8 bolt heads into slot on the bottom of the sill and set it in place on the sub sill. Match the center marks of sill and subsill, make sure it is aligned with the front edge of the subsill as shown in the drawing, then place and tighten nuts and lock washers to secure the sill in place.



Door Frames

Refer to the illustration while assembling the frame.

Figure 4.6 Installing The Door Frame

Rough Material Assembly

Refer to the illustration while assembling the frame.

1. Make sure subsill angle on Daylight Line side is set approximately $\frac{3}{16}$ " before line if frame has standard 2-1/4" wide face.
2. Attach strut extensions to struts using $\frac{3}{8}$ " x 2" bolts through pre-tapped Strut Keeper.
3. Attach Strut bottoms to Sub Sill with $\frac{3}{8}$ " x 1-1/4" bolts, nuts, and lock washers.
4. Attach Header angle to Struts with $\frac{3}{8}$ " x 1" bolts and nuts.
5. Extend Strut extensions to Sill Angle or Sub Sill of floor above and attach.
(If floor rise is greater than supplied Struts and Extensions, then tie off using Wall Angle)

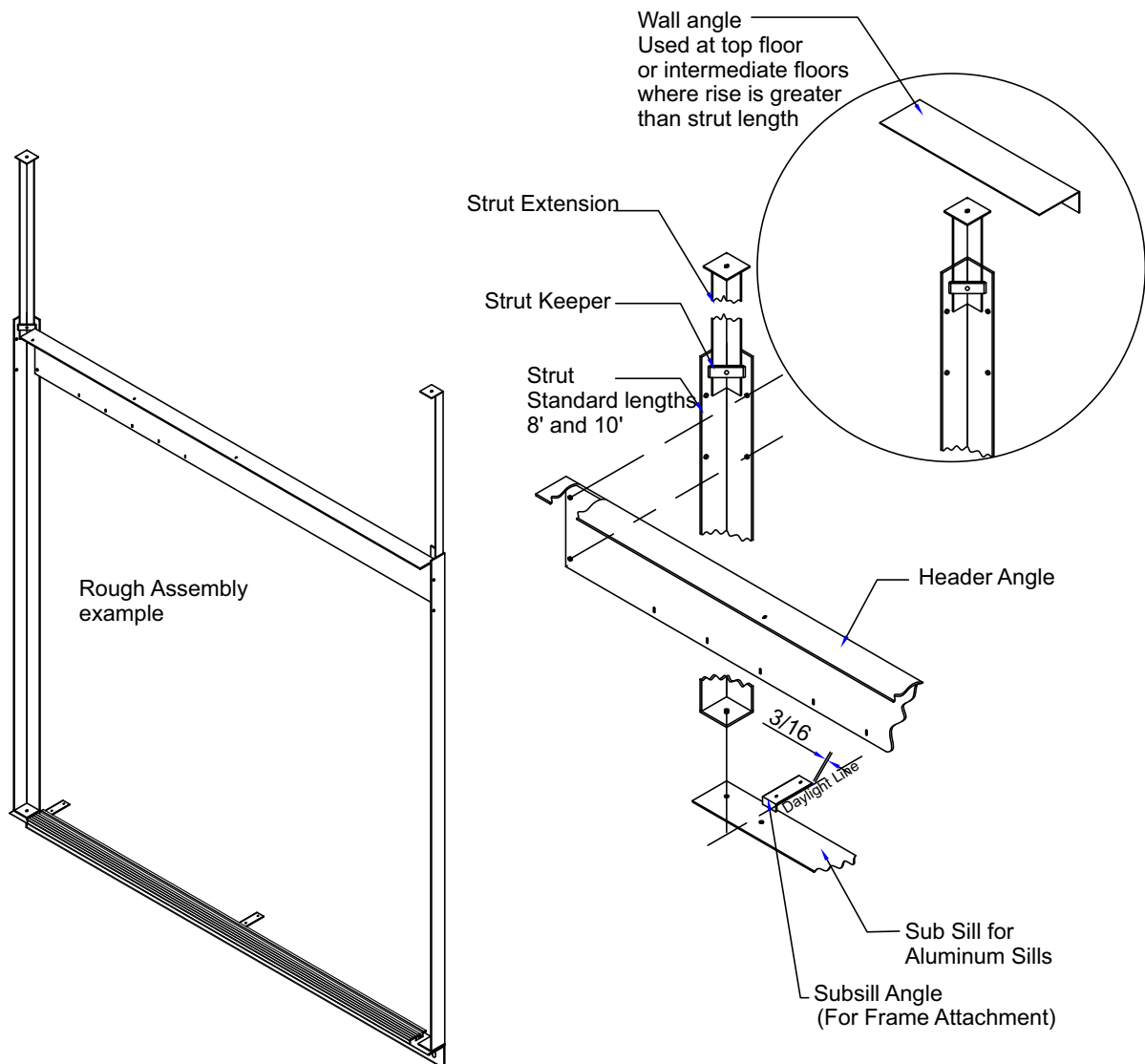
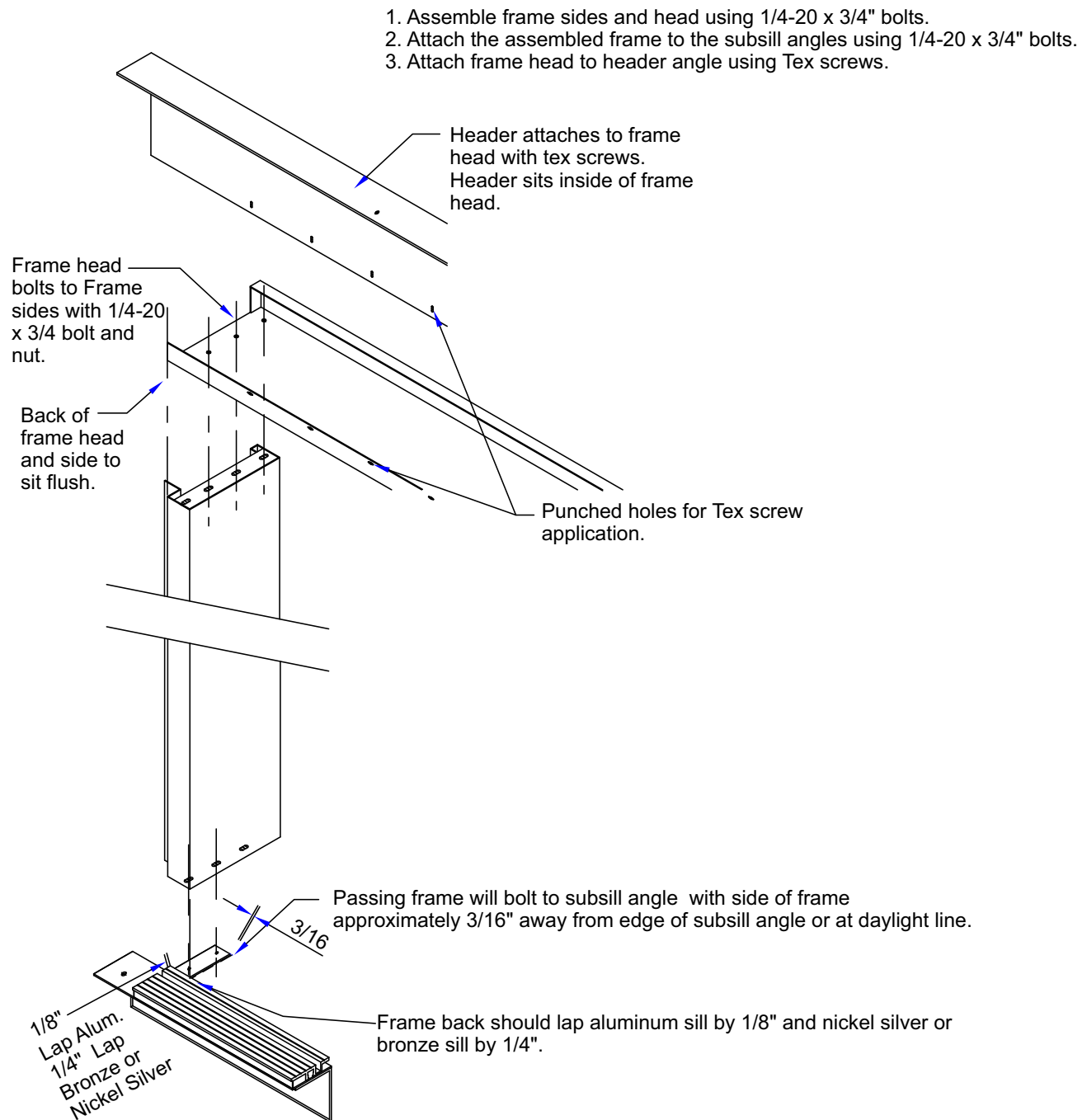


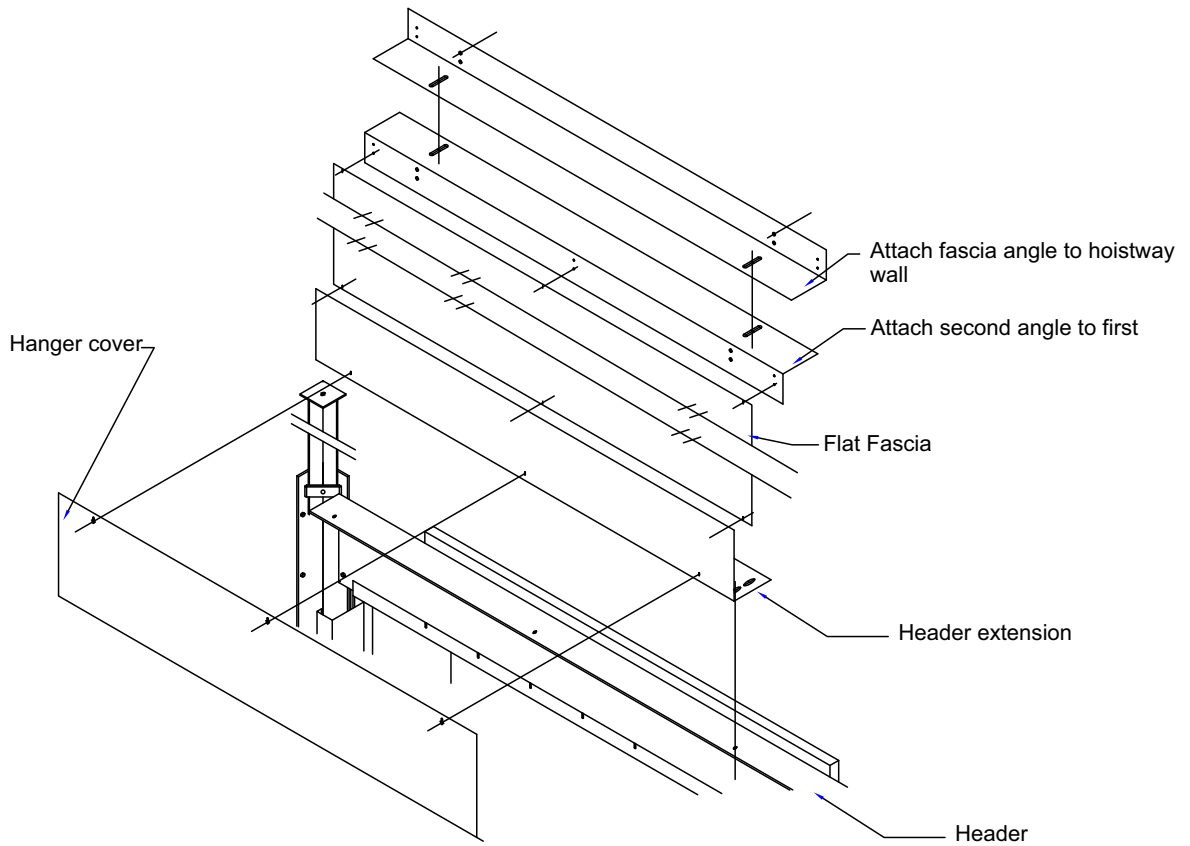
Figure 4.7 Assembling the Entrance



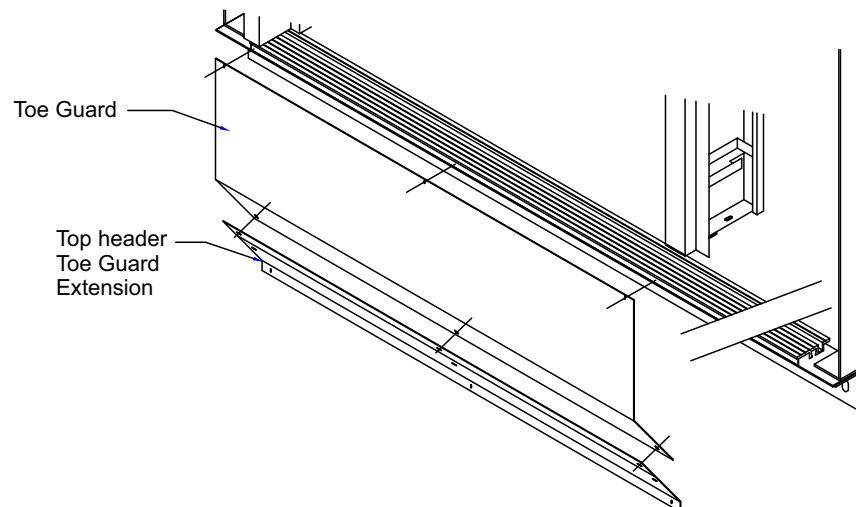
Finish Assembly, Mid and Bottom Floors

Figure 4.8 Dust Cover Angle, Top Fascia, Dust Cover

Finish Assembly, Mid and Bottom Floors



1. Attach header extension to header angle with 3/8" x 1" bolts and nuts.
2. Attach hanger covers to header extension with 10-32 x 1/2" screws.
3. Attach flat fascia to header extension and to sill above with Tex screws.
If the floors are too tall to attach flat fascia to the sill above, fascia angles are provided:
4. At bottom floor attach toe guard to sill using tex screws and then extension to guard. Extension is then attached to pit wall.

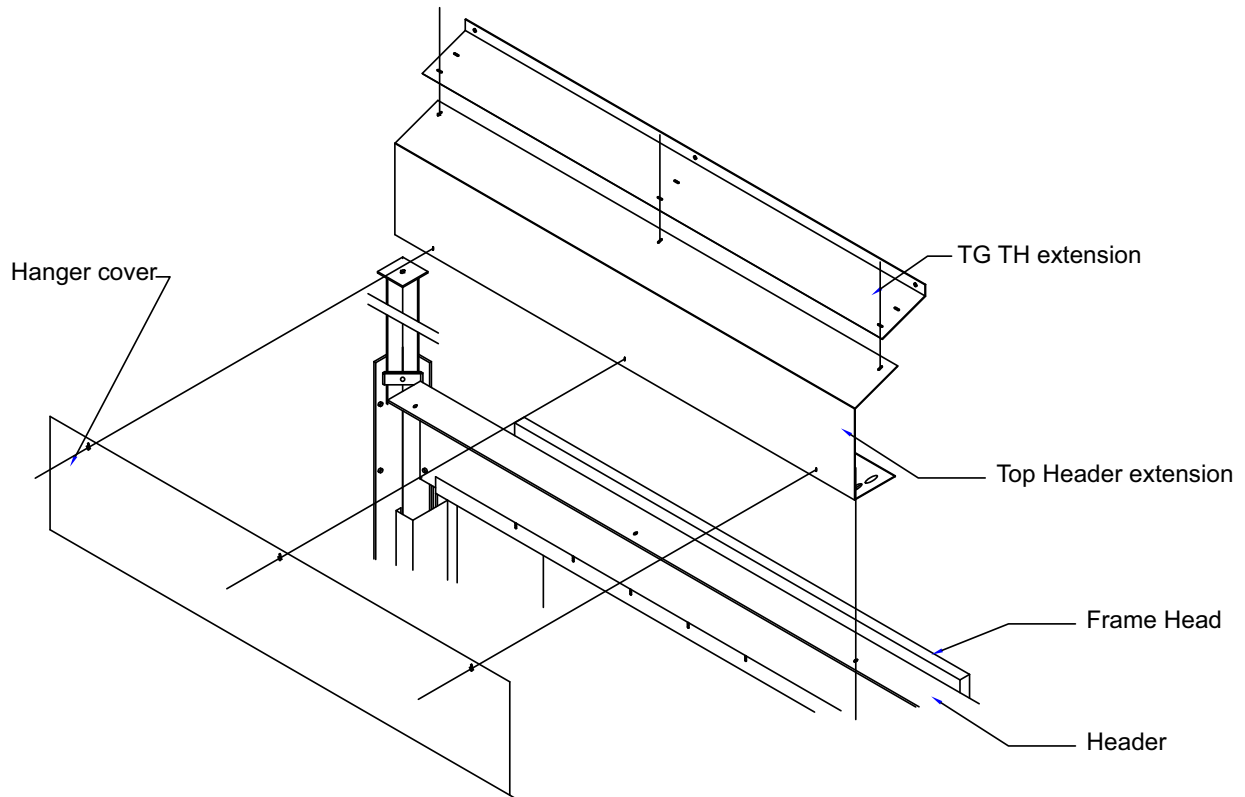


Finish Assembly, Top Floor

A special dust cover angle and fascia are provided for the top floor.

Figure 4.9 Dust Cover Angle, Top Fascia, Dust Cover, Top Floor

Finish Assembly, Top Floor



1. Attach Top Header extension to header angle with 3/8" x 1" bolts and nuts.
2. Attach hanger covers to header extension with 10-32 x 1/2" screws.
3. Attach THTG extension to Top Header extension and to hoistway wall above with Tex Screws

Hatch Doors

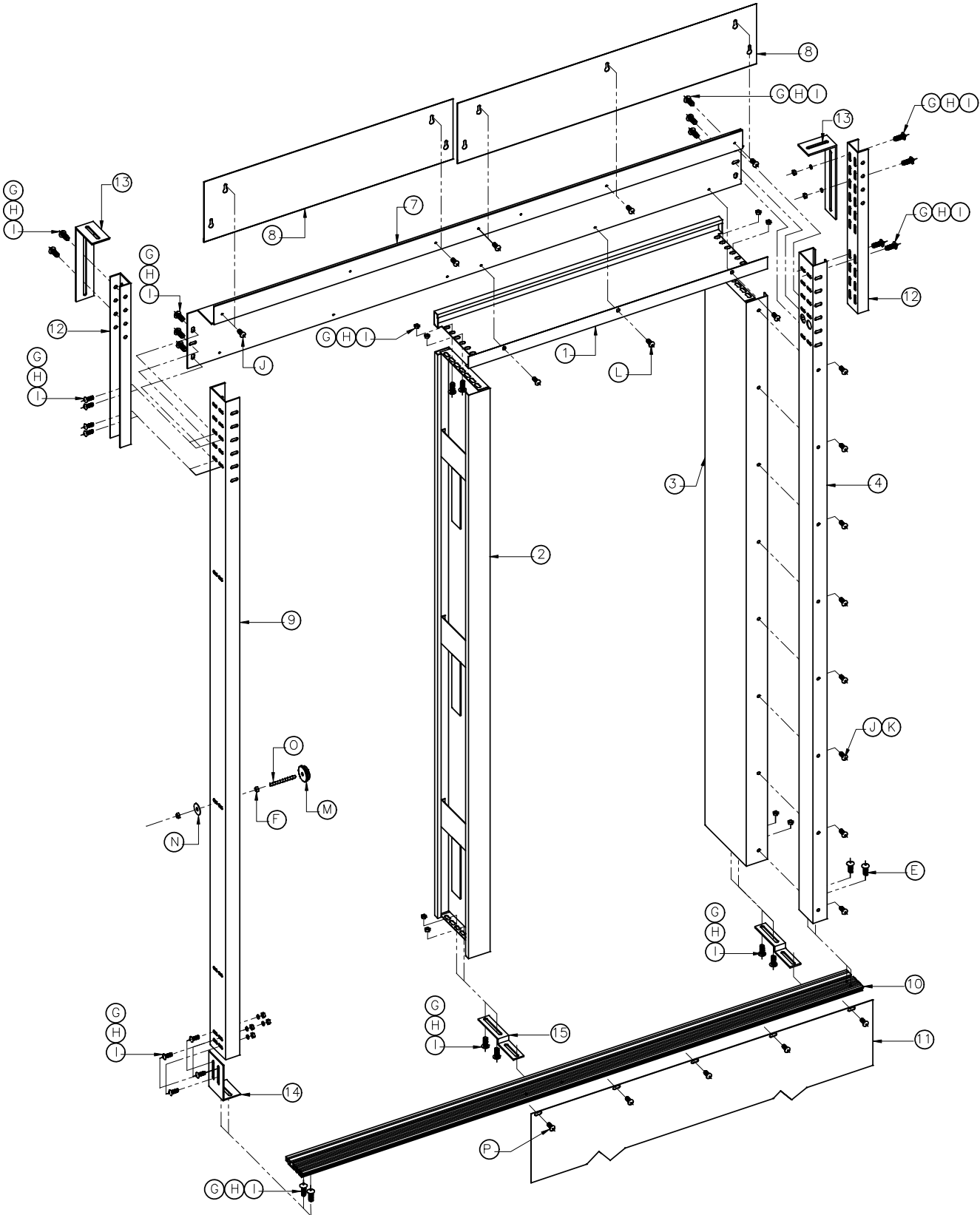
The door track is provided with sheaves/hangers and required hardware along with installation drawings.

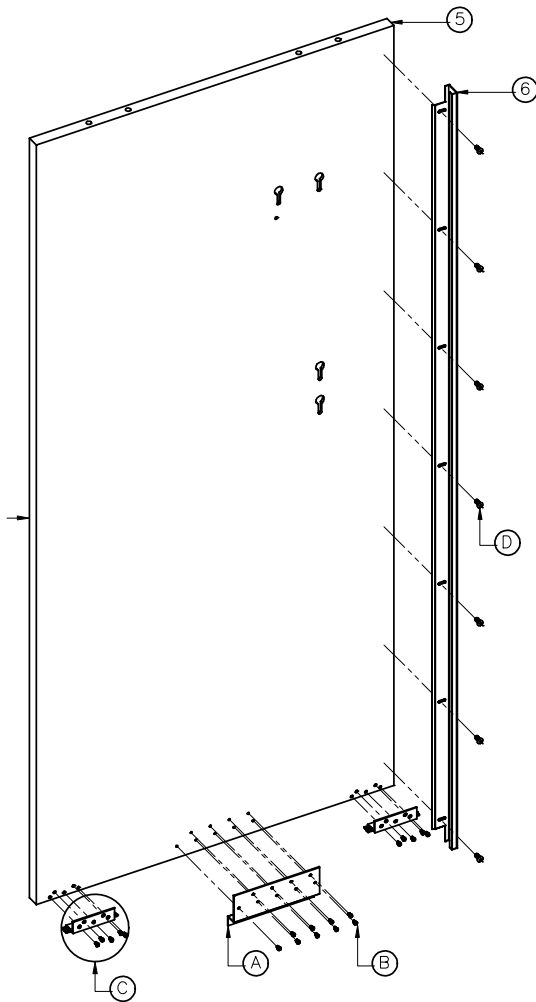
National Entrances

The instructions on the following pages are for National hall doors and entrances.

SPACE BELOW INTENTIONALLY LEFT BLANK.

Figure 4.10 National Side Slide, Exploded View





BILL OF MATERIAL PER ASSEMBLY

ITEM #	QTTY	DESCRIPTION
MAIN PARTS	1	HEAD JAMB
	2	RETURN JAMB
	3	STRIKE JAMB
	4	STRIKE UPRIGHT
	5	HATCH DOOR
	6	SIGHT GUARD
	7	HEADER
	8	HANGER COVER
	9	REAR UPRIGHT
	10	SILL
	11	FASCIA
	12	UPRIGHT EXTENSION
	13	UPRIGHT (EXT.) MOUNTING BRACKETS
	14	REAR UPRIGHT BRACKET
	15	3/4" SILL OFFSET CLIPS (STEEL)
DOOR HARDWARE	A	FIRE GIB - 3/4" OFFSET, 8" LONG
	B	#10 X 1/2" FLAT HD. PHILLIPS SCREWS
	C	DOOR GUIDES W/ SCREWS
	D	#10 X 1/2" WAFER SELF DRILLING SCREW
STANDARD BOXED HARDWARE	E	5/16-18 X 3/4" FLANGED HEX HEAD BOLTS
	F	5/16-18 FLANGED HEX HEAD NUTS
	G	3/8-16 X 1" HEX HEAD BOLTS
	H	3/8-16 FLANGED HEX HEAD NUTS
	I	3/8 WASHERS - FLAT
	J	1/4-20 X 3/4" FLANGED HEX HEAD BOLTS
	K	1/4-20 FLANGED HEX HEAD NUTS
	L	1/4-20 X 3/4" TRUSS HD PH MACH. SCREW
	M	1 7/8" ROUND BUMPER
	N	5/16 X 1 1/2" FENDER WASHER
	O	5/16-18 X 2" CARRIAGE BOLT
	P	AS REQ #12 X 1/2" PAN HEAD TAP SCREWS
	Q	AS REQ 3/8" X 1 1/4"/2 1/4" ANCHOR BOLTS



**NATIONAL ELEVATOR
CAB & DOOR CORP**
WWW.NECD.COM

ENTRANCE
LAYOUT

S/SP ENTRANCE EXPLODED VIEW
LEFT HAND AS SHOWN

CUSTOMER:

DRAWN BY: O.O.

CHECKED BY:

DATE: 02/22/11

SHEET #:

1 OF 6

NATIONAL JOB #

INSTDWG101

DRAWING # INSTDWG101-1

Figure 4.11 National Side Slide Assembly, Left Hand

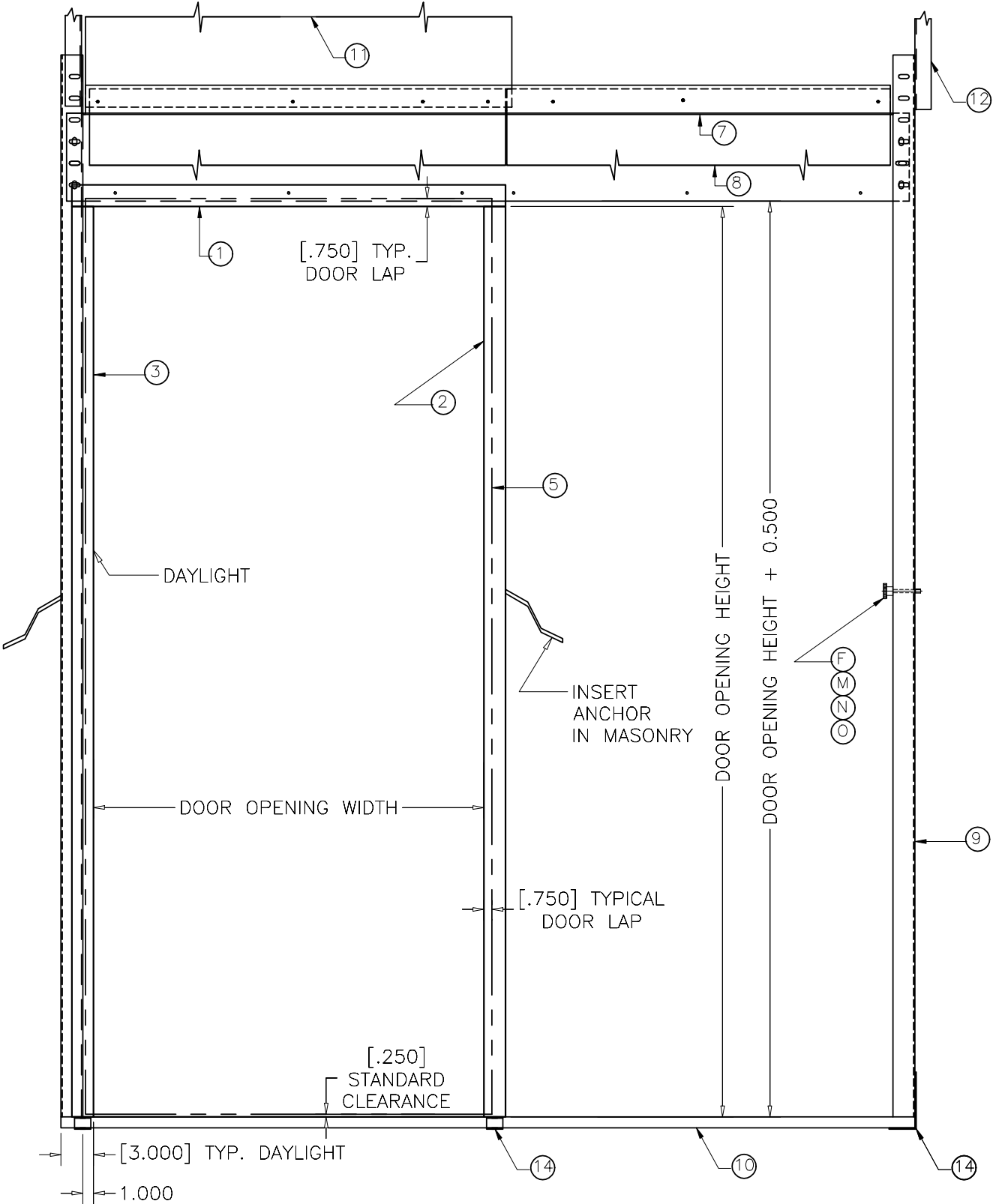
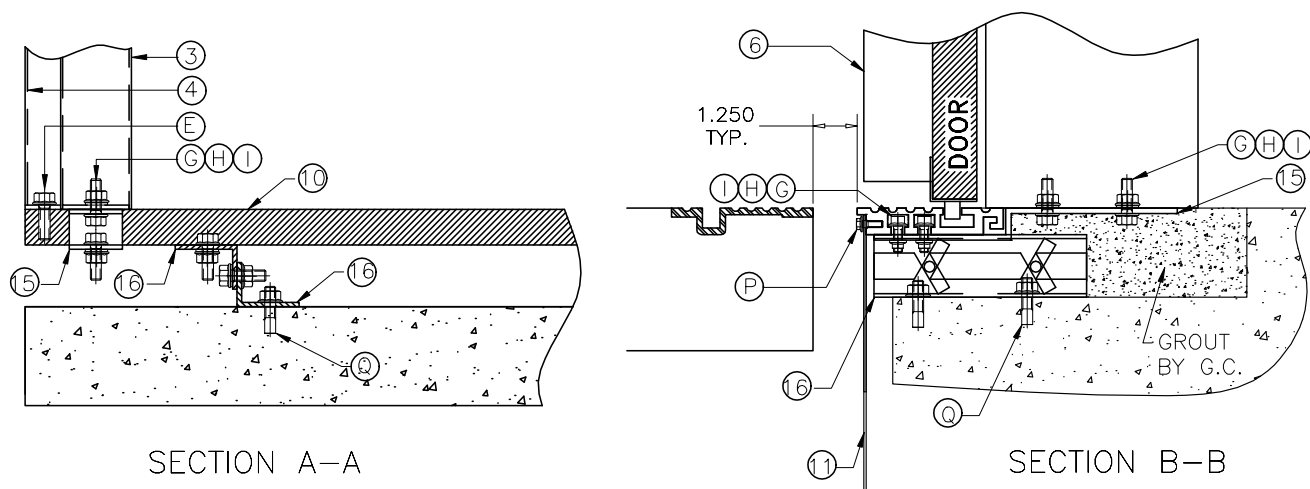
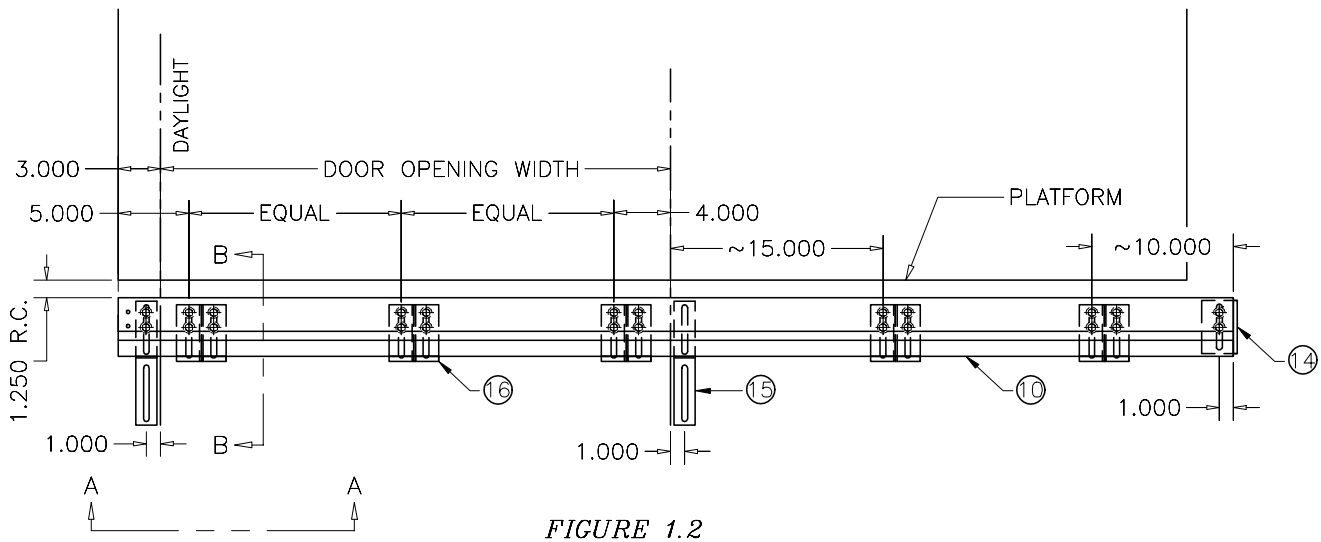


FIGURE 1.1

[illegible]

		NATIONAL ELEVATOR CAB & DOOR CORP WWW.NECD.COM	
ENTRANCE LAYOUT	S/SP ASSEMBLY (FRONT VIEW) LEFT HAND AS SHOWN		
CUSTOMER:			
DRAWN BY:	O.O.	CHECKED BY:	
DATE:	02/22/11	SHEET #:	2 OF 6
NATIONAL JOB #		INSTDWG101	
DRAWING #	INSTDWG101-2		

Figure 4.12 National Side Slide, Sill Detail, Left Hand



Entrance Sills

Sill Pre-assembly:

1. Insert (16) 3/8" bolts (Item G) into the grooves under the sill as shown in Figure 4.10, Section B-B. Note hand of opening.
2. Mark the door opening location on the sill and position the bolts along the length of the sill using the reference locations shown in Figure 4.10, sub figure 1.2.
3. Place pre-assembled sill on top of pocketed slab and adjust the supports so that the top of the sill is aligned with the finished floor.
4. Attach the top and bottom adjustable sill support (Item 16) to each other using the 3/8" hardware as shown in Figure 4.10, Section A-A.
5. The daylight on the hatch sill is 3" from the edge as shown in Figure 4.9, sub figure 1.1. Adjust the horizontal position of the sill using this reference daylight in relation to the cab daylight. Tighten up all bolts.

Figure 4.13 National Uprights and Header Assembly Detail, Left Hand

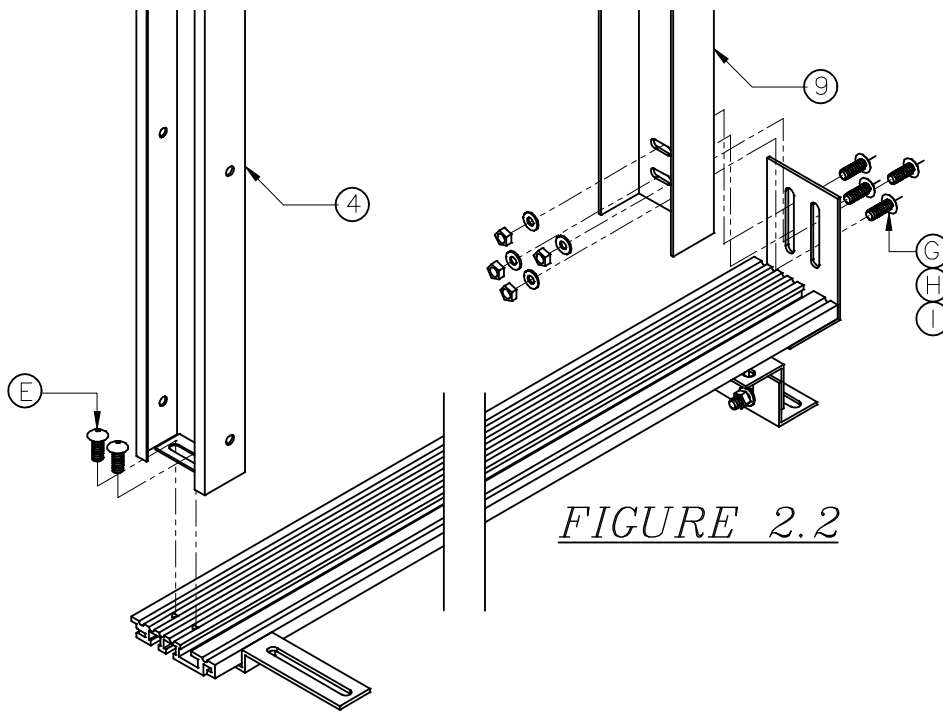


FIGURE 2.1

1. On the daylight side of the sill are pre-tapped holes. Attach the strike upright (Item 4) to these holes using (2) 5/16-18 x 3/4" flanged hex head bolts (Item E).
2. REAR UPRIGHT ASSEMBLY: Set the rear upright (Item 9) at the end of sill (at the opposite end of daylight side). The sill should be pre-assembled with rear upright bracket (Item 14).
3. Using the 5/16" bolts, attach the rear upright (Item 9) to the rear upright bracket (Item 14) as shown in Figure 4.11, sub figure 2.2.
4. Assemble the door bumper on the rear upright (Item 9) using the round 1 7/8" rubber bumper (Item M), 5/16-18 x 2" carriage bolt (Item O), and 5/16-18 x 1 1/2" fender washer (Item N). The door bumper can either be assembled at the top, mid, or bottom section of the rear upright. See Figure 4.12, sub-figure 2.4.
1. HEADER ASSEMBLY: If desired, attach track to header before installing header. (Refer to track manufacturer mounting instructions). Carefully lift the header (Item 7) and align the three slots on the edges with the bottom three slots of the top of the uprights. (The height of uprights and the number of slots at the top may vary per job condition.)
2. Place 3/8" bolts in the middle holes on the edges of the header and hold it in place. Please note that on the daylight side, the header is outside the strike upright and on the opposite side the header is inside the rear upright from the corridor side as shown in Figure 4.12, sub figures 2.3 and 2.4.
3. Attach the header to the uprights with 5/16" bolts (do not tighten yet). Measure to confirm that the bottom of the header to the finished floor or sill level is equal to opening height + 1/2". Square assembly and tighten all bolts.

Figure 4.14 Uprights and Header Assembly Detailed, Continued

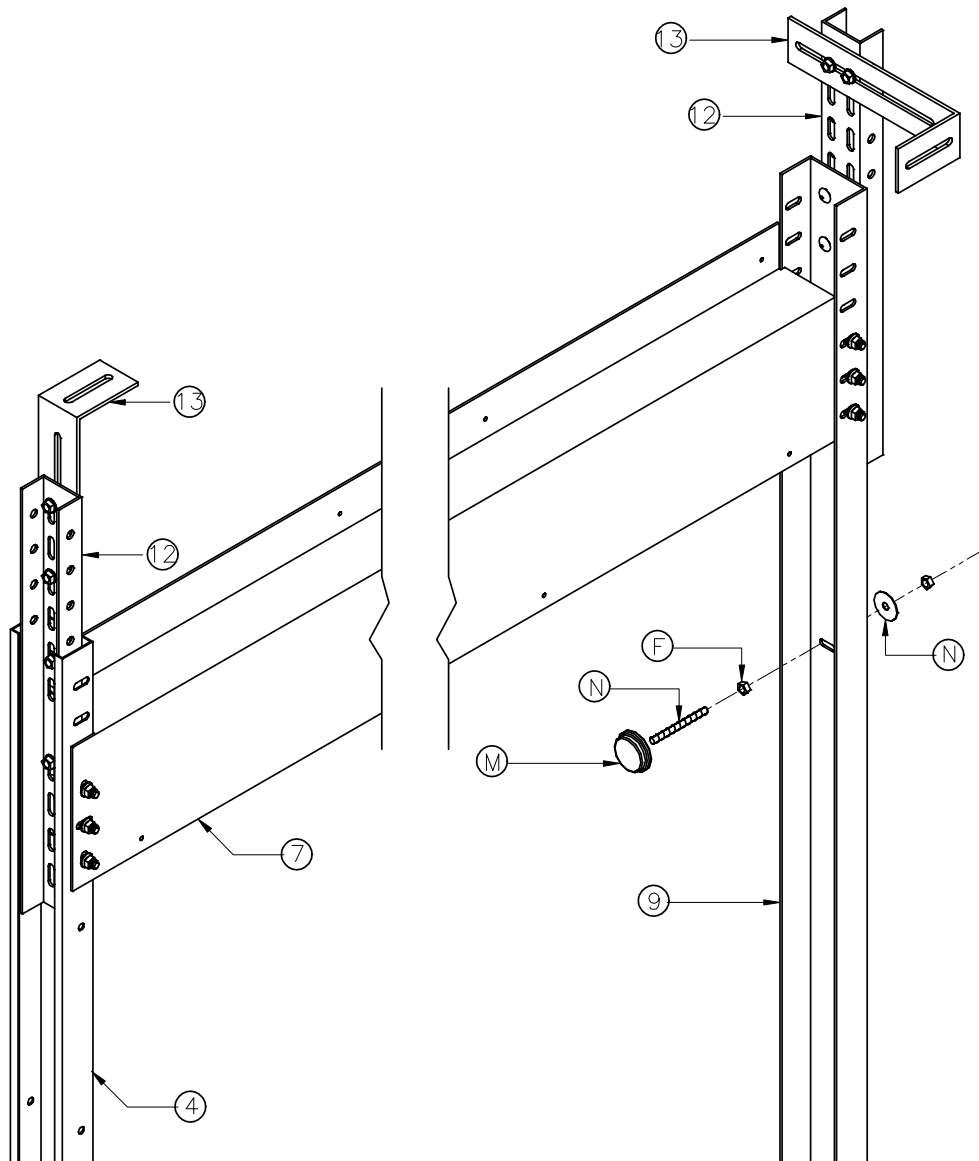
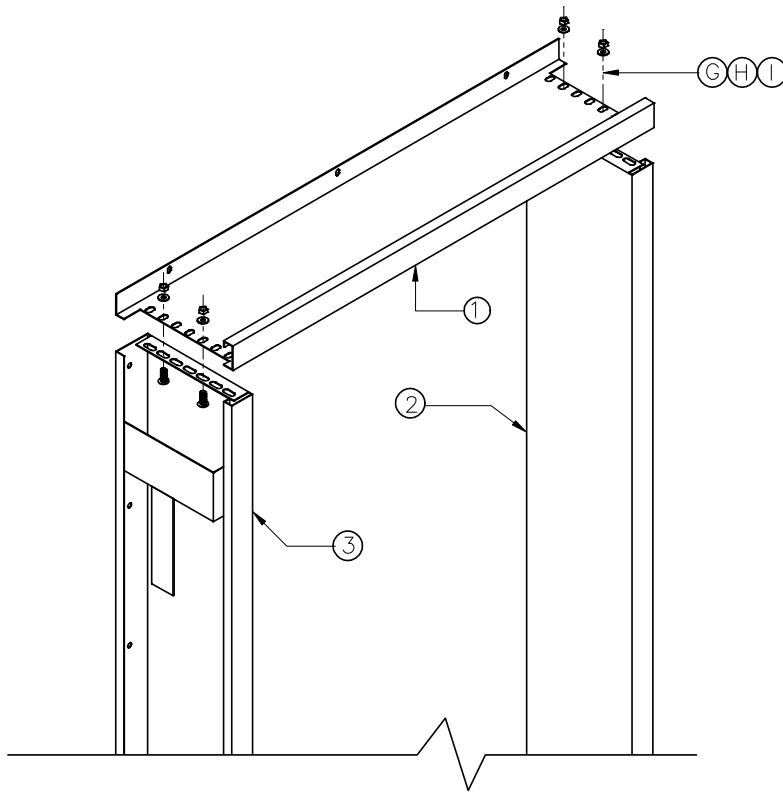


FIGURE 2.3

FIGURE 2.4

4. Tie the uprights (or if ordered, upright extensions, Item 12) to the hoistway wall or beam above using the upright brackets (Item 13) provided per floor.
5. Attach uprights, extensions, and upright brackets together with 5/16" bolts.
6. Fasten the upright bracket to wall or beam with 3/8" anchor bolts (Item Q). Check assembly for level and square again. Adjust as needed.

Figure 4.15 Jamb Assembly and Installation, Left Hand Shown*FIGURE 3.1*

1. Place the head jamb (Item 1) on top of the return jamb (Item 2) and strike jamb (Item 3). Assemble with (2) 3/8" hardware (Items G, H, and I) on each edge as shown in Figure 4.13, sub figure 3.1. Make sure the frame is square and edges of head jamb are flush with outside edges of frame. (Head jamb should be flush at the back side of return jamb and would normally overhang 1/8" in the front (if frame is not flush), depending on customer request.
2. Confirm opening width before tightening all bolts.

**Caution**

Prior to installing frame assembly to sill, use caution handling assembled frame to avoid bending at assembly points.

1. Carefully place assembled frame on top of pre-assembled sill so that the head jamb rear flange is tucked behind the bottom of the header.
2. The return jamb (Item 2) and strike jamb (Item 3) should also be sitting on top of the sill offset clip (Item 15) as shown in Figure 4.14, sub figure 3.2.
3. Insert 3/8" bolts (Item G) from the bottom of the sill offset clip (Item 15) through to the bottom flange of the jambs. Fasten securely with 3/8" nuts and washers (Items H and I).
4. To properly locate the horizontal position of the assembled jamb, first attach the head jamb (Item 1) to the header (Item 7) with 3, 1/4-20 x 3/4" truss head machine screws (Item L). The header is tapped for this application.

Figure 4.16 Jamb Assembly and Installation, continued

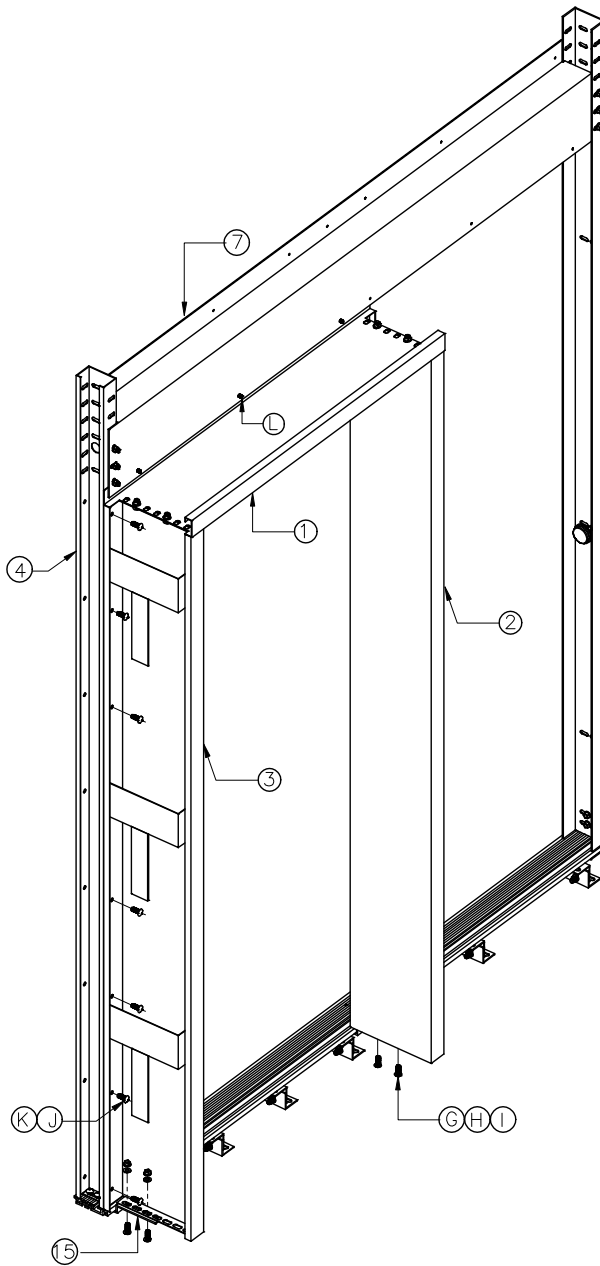
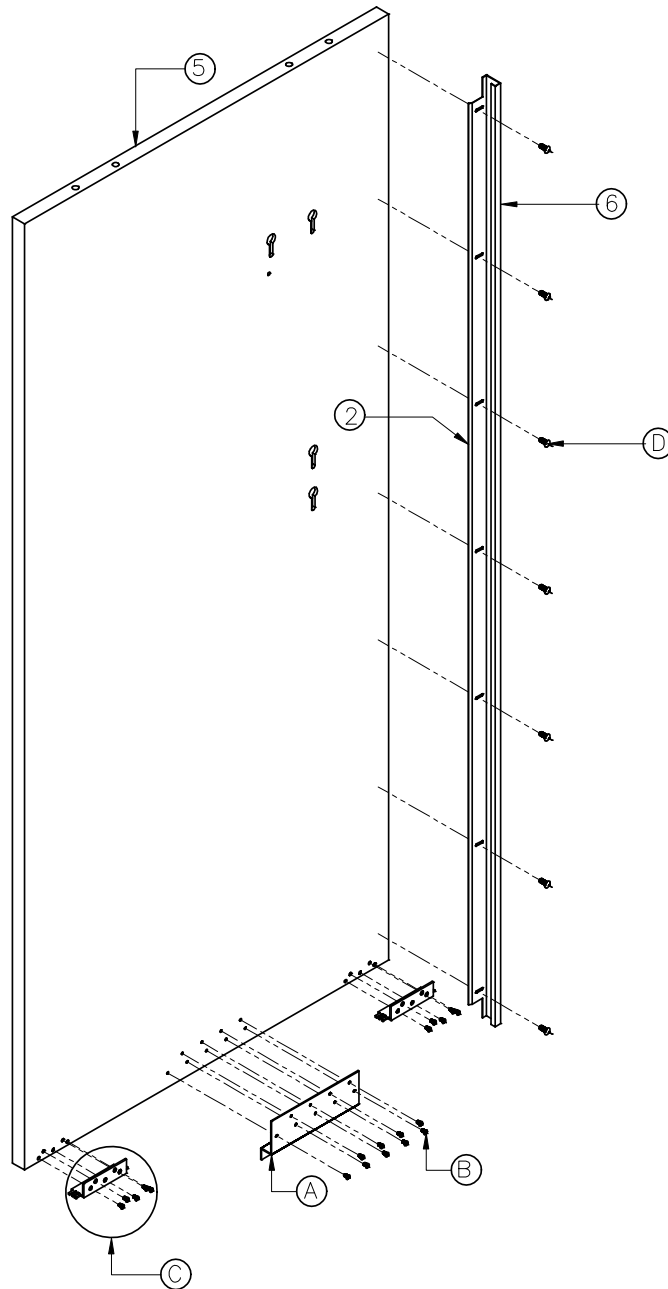


FIGURE 3.2

5. Using 1/4-20 hardware (Items J & K), attach the strike jamb (Item 3) and the strike upright (Item 4) together as shown in Figure 4.14, sub figure 3.2. The strike pocket should have a 1" recess when properly assembled.
6. Adjust the sill offset clip (Item 15) as needed. Square jambs at bottom and check opening width.
7. Insert (2) 3/8" bolts from bottom of each sill offset clip (Item 15) through to the bottom flange of the return and strike jambs (Items 2 & 3).
8. Fasten the offset clips to the jambs securely with 3/8" hardware (Items H & I). Re-check door opening size and frames for level and plumb. Adjust if needed.

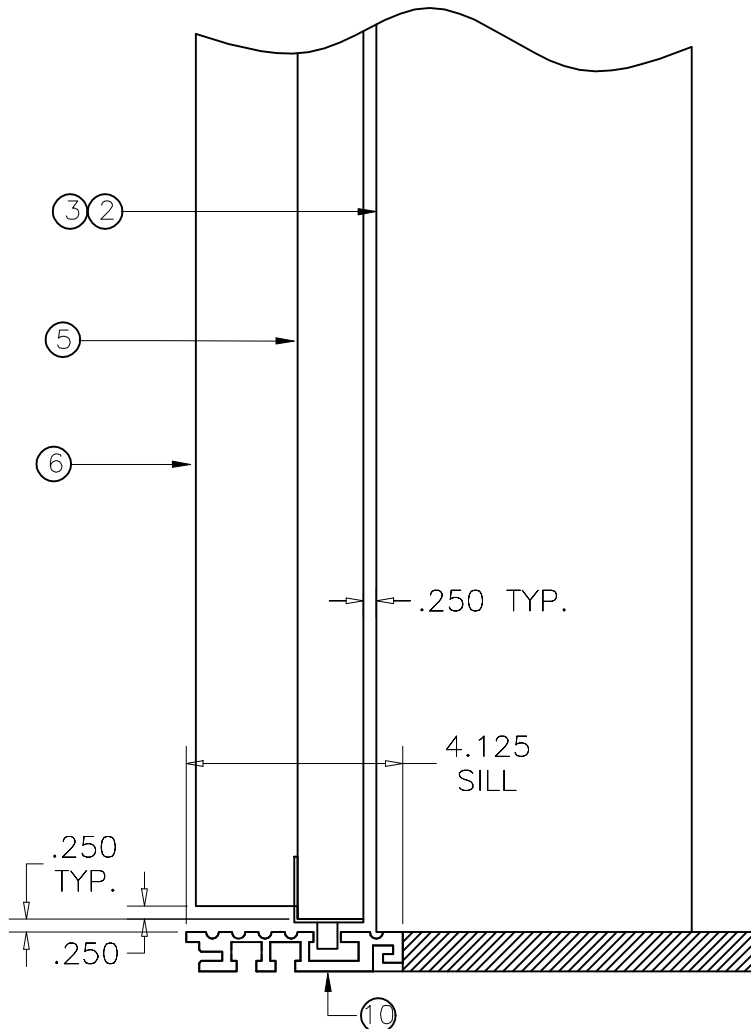
Figure 4.17 Door Assembly and Installation



There are (2) door guides (Item C) packaged in a bag per entrance. Use the hardware provided to attach the two gibs on the bottom edges of the door as shown in Figure 4.15. Adjustable gibs are used so determine proper gib setting prior to installation.

1. One fire gib is provided per entrance. Use the #10 x 1/2" flat head phillips screws (Item B) to attach the guide to the bottom center of the door as shown in Figure 4.15.

Figure 4.18 Door Assembly and Installation, continued



2. Hang door assembly onto header track making sure gibs are inserted into groove of sill.
3. Tip door forward under hoistway track pendant and install track fasteners furnished by track supplier.
4. Level door and position it within 1/4 to 3/8" clearance between door bottom and sill. Door height and clearances can be adjusted to the required tolerances.
5. Make sure door panel is square with jambs and bottom gibs are running through sill groove without interference. Then tighten hanger bolts.
6. Attach sight guard to the door with #10 x 1/2" self-drilling screws (Item D) to leading edge of door. The sight guard should be attached 1/4" from the bottom of the door.

Cab Assembly

Materials needed to assemble the cab are:

- Cab construction drawings and dimensions
- Steel wall and corner panels
- Steel canopy panels
- Transom
- Assembly hardware
- Ventilation fan
- Interior ceiling/lighting and wall panels
- Reveals and base strips
- Handrails and hardware

Figure 4.19 Standard Elevator Cab Example



Note

Your equipment may be different. Please review cab construction drawings carefully.

Cab Shell Panels

The cab shell wall panels are fixed width, standard panels. The corner panels are shaped and sized as needed to achieve the wall length required. The roof canopy is designed to support car top electronics and an inspection operation station.

Cab Shell Wall Panels

Wall panels are fixed width. Each panel is vented top and bottom. Panels may be unpainted steel, stainless, or powder-coated depending upon cab interior requirements.

Figure 4.20 Powder-coated Wall Panel

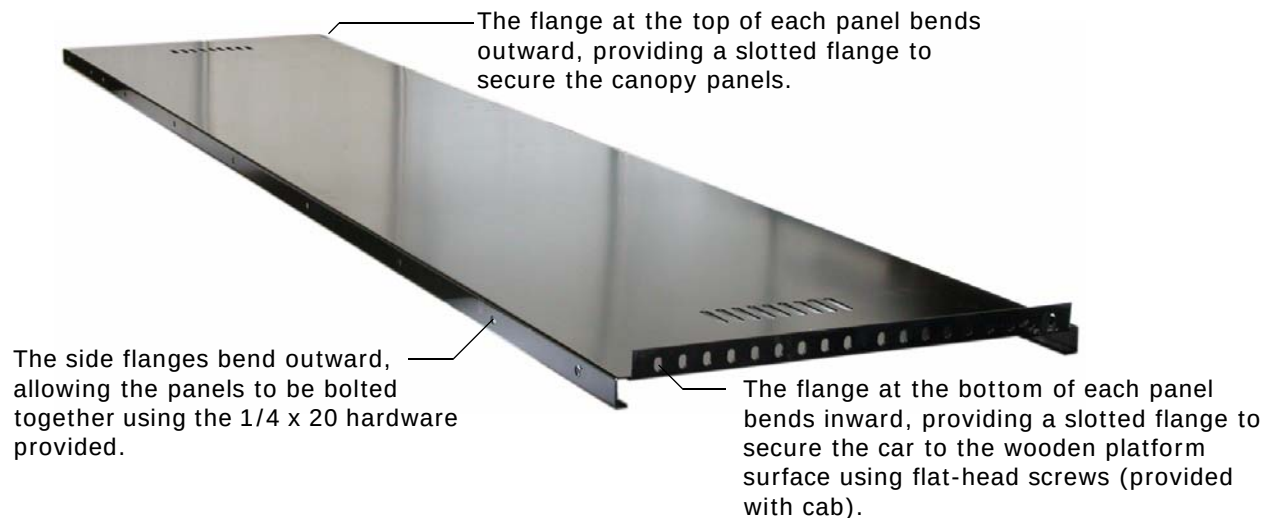


Figure 4.21 Wall Panel Exterior Reinforcement for Hand Rail Mounting

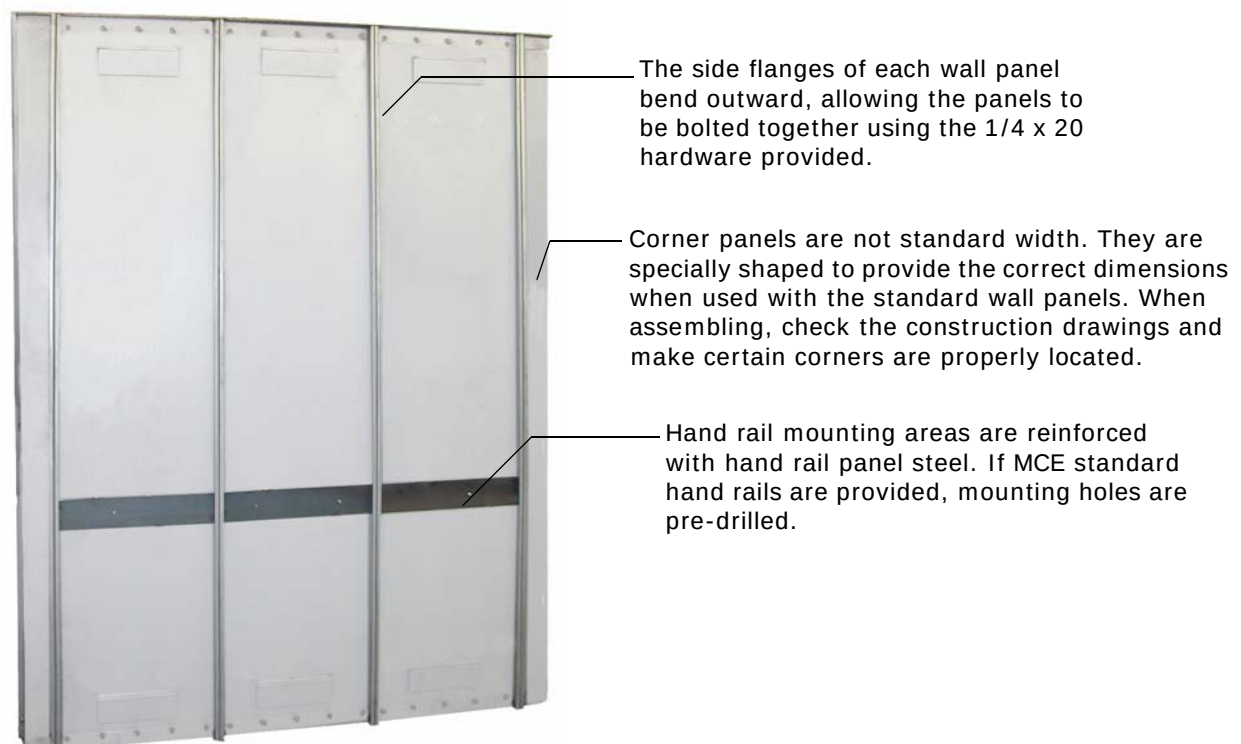
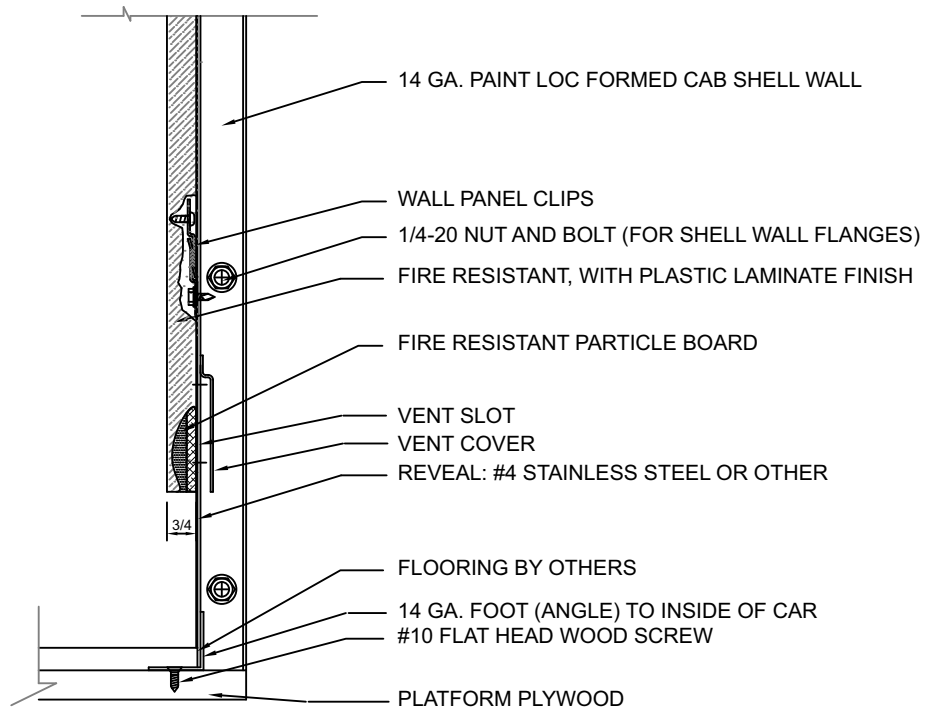


Figure 4.22 Wall Panel Side View Detail with Interior Panel



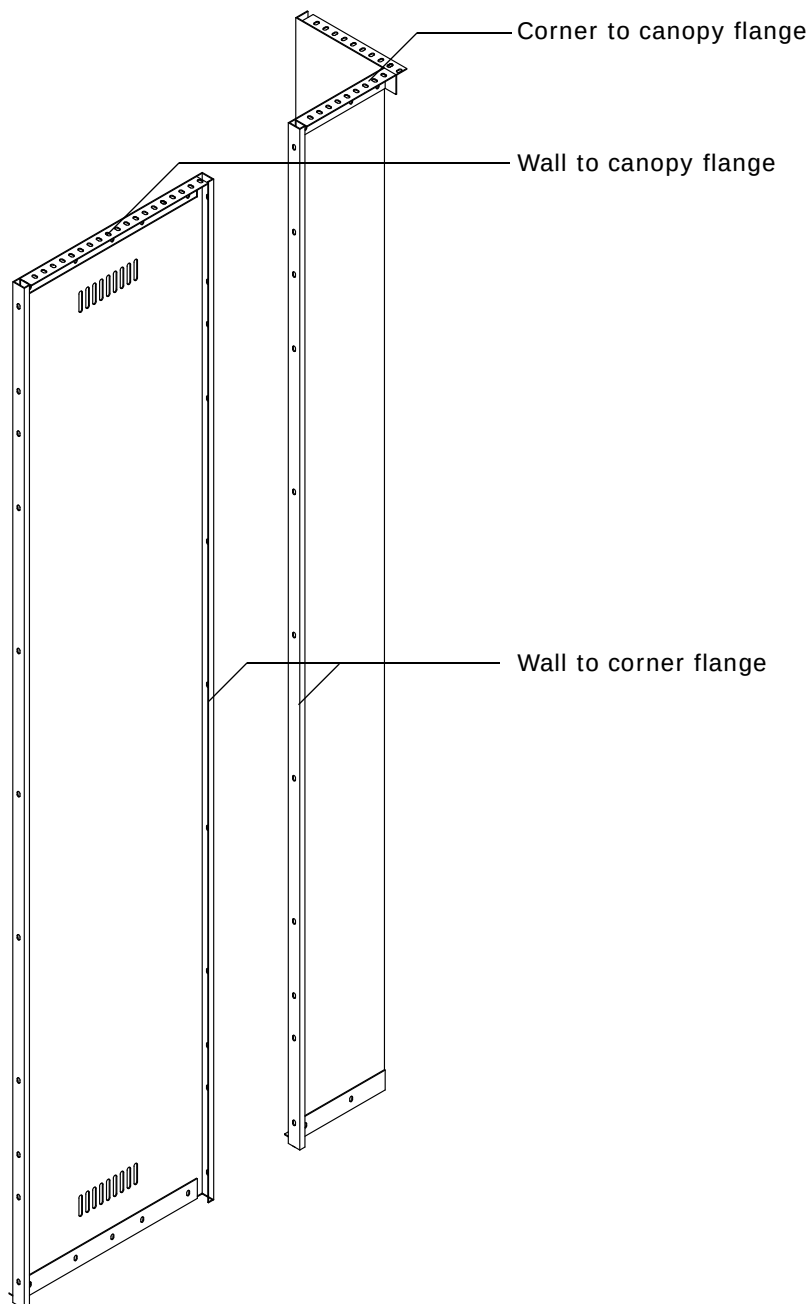
DETAIL - WALL PANEL / SHELL

Corner Panels

The cab shell corner panels are sized as required to achieve the correct cab dimensions when used with the standard width wall panels. When setting up the cab, it is critical to check the cab dimensions and place the corners in the correct locations.

- Single entrance cars have two corners — one at each corner of the back of the cab
- Front, Strike, and Transom connect to the flanges on the front-most wall panels
- Through-cars have no corners — Front, Strike, and Transom connect to the flanges on the front-most and rear wall panels

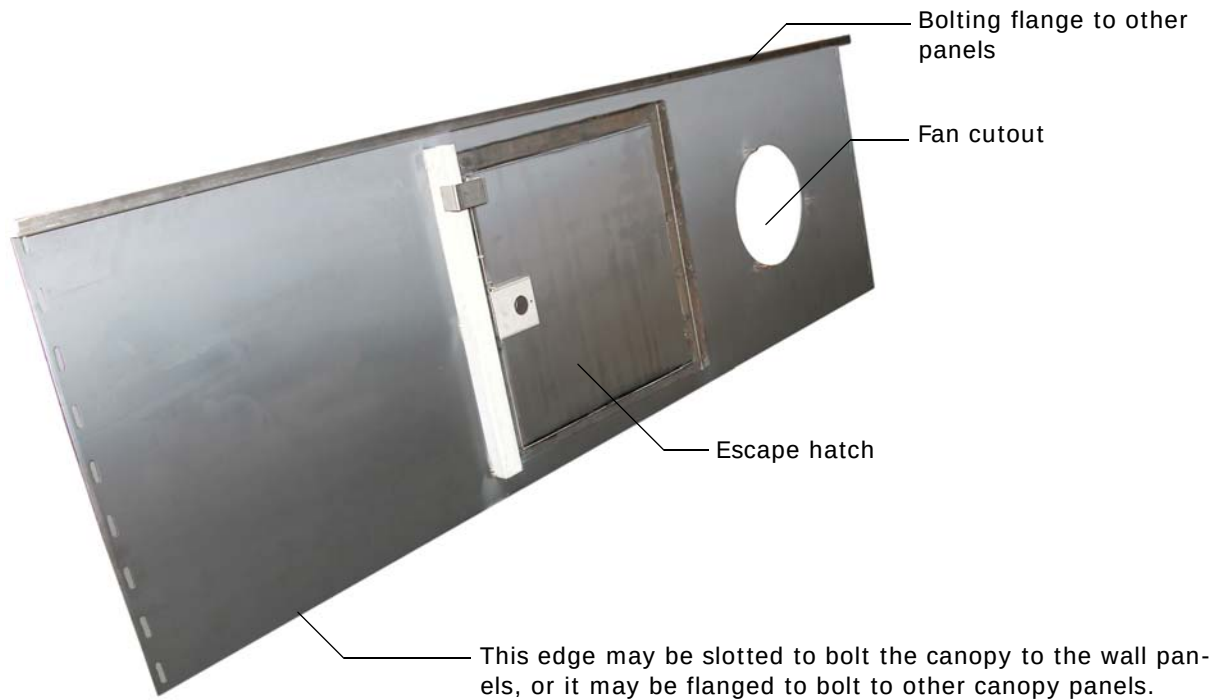
Figure 4.23 Corner and Wall Panel Example



Canopy Panels

Canopy panels, like the wall panels, have slotted flanges that face outward, allowing the panels to be bolted together using 1/4 x 20 hardware. An escape hatch and a fan cutout are provided. Refer to the cab drawings to determine canopy panel placement.

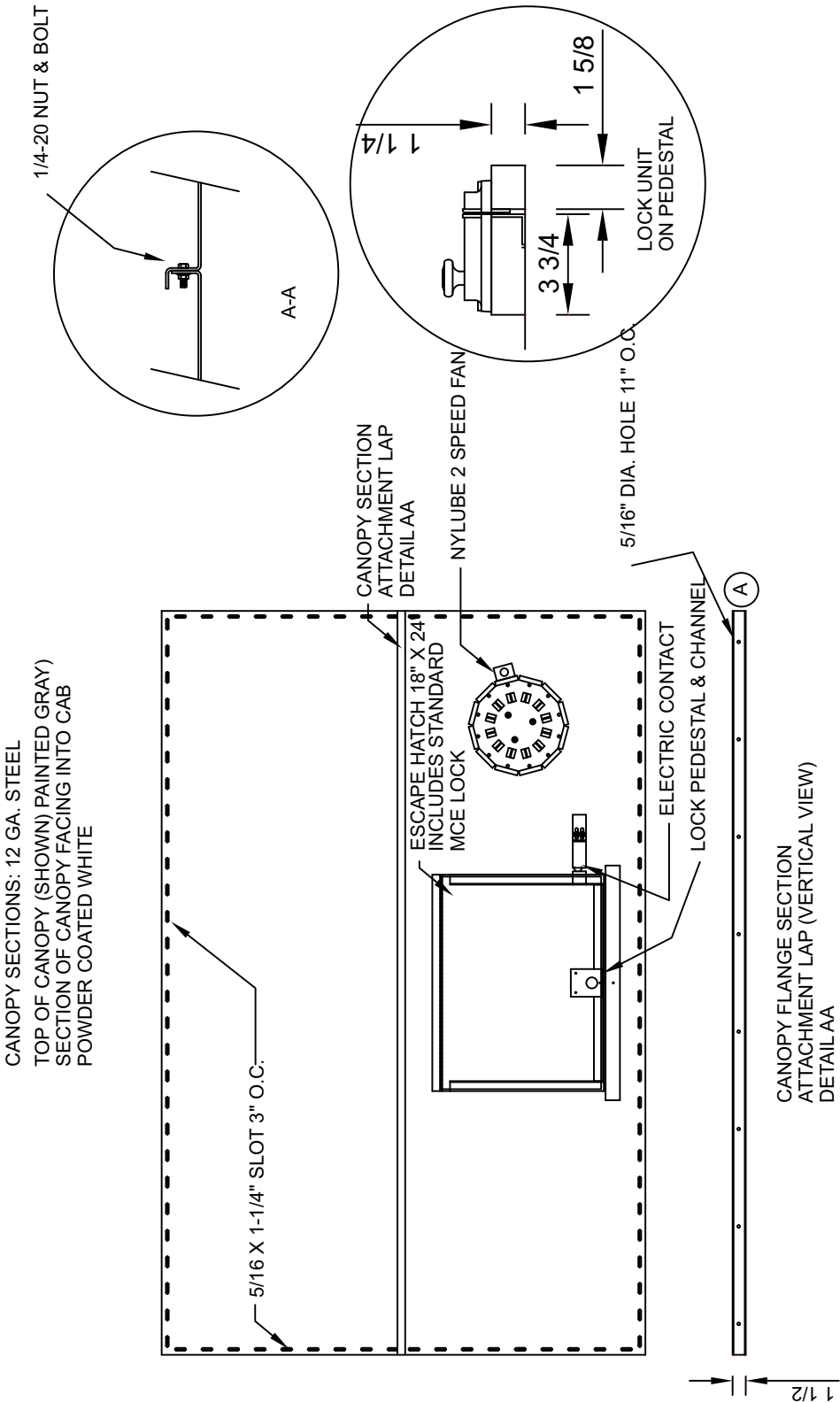
Figure 4.24 Plain Steel Canopy Panel with Escape Hatch and Fan Cutout



Note

Your equipment may be different, always follow the installation drawings.

Figure 4.25 Standard Canopy Assembly



Transom

The transom is installed across the top, front of the cab between the canopy and the entry. If the cab has front and rear openings, two transom panels are provided.

The transom bolts to the canopy, to the return/front, and to the wall panels as shown below. The bottom ledge of the transom supports short channel lengths for door header mounting.

Figure 4.26 Cab Transom



Note

Your equipment may be different, always follow the installation drawings.

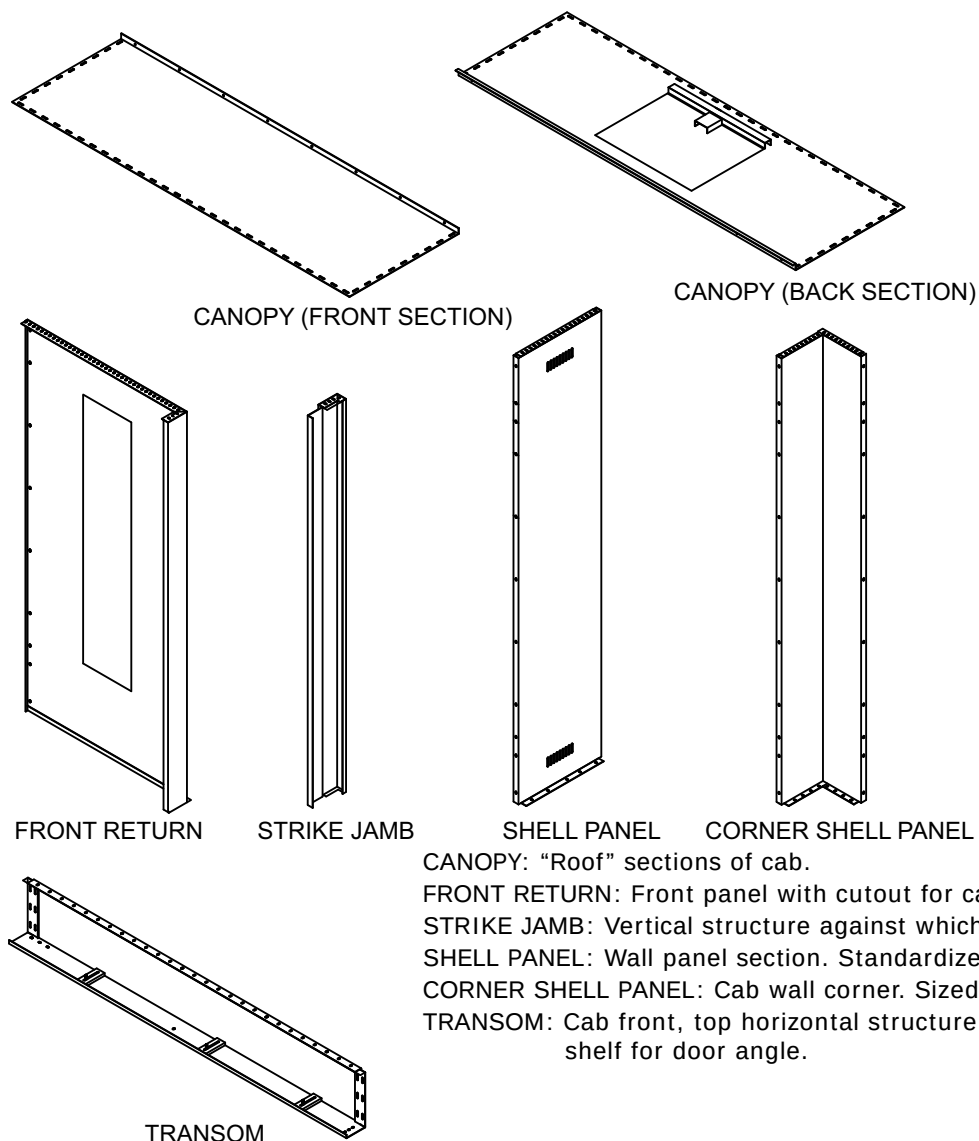
Assembly Process

The following drawings and instructions are generic. The actual elevator cabs delivered to your site have plan view drawings specific to your installation. These instructions are in the form of a series of seventeen (17) annotated drawings.

Figure 4.27 Typical Side Slide Door Shell Components

TYPES OF HARDWARE SUPPLIED FOR CAB ASSEMBLY

- 1/4-20 X 3/4" NUT (CAB SHELL)
- 1/4-20 SERRATED FLANGE NUT (CAB SHELL ETC.)
- 3/8-16 X 1-1/4" BOLT (HANDRAIL)
- 5/16-18 NUT (HEADER ANGLE)
- 5/16 LOCK WASHER (HEADER ANGLE)
- #10 X 1/2" SHEET METAL SCREW (WALL CLIP)
- #10 X 5/8" FLAT HEAD WOOD SCREW (FLOOR ANGLE)
- CAB STEADIER UNITS SUPPLIED WITH PACKAGED HARDWARE



CANOPY: "Roof" sections of cab.

FRONT RETURN: Front panel with cutout for car operating panel. *

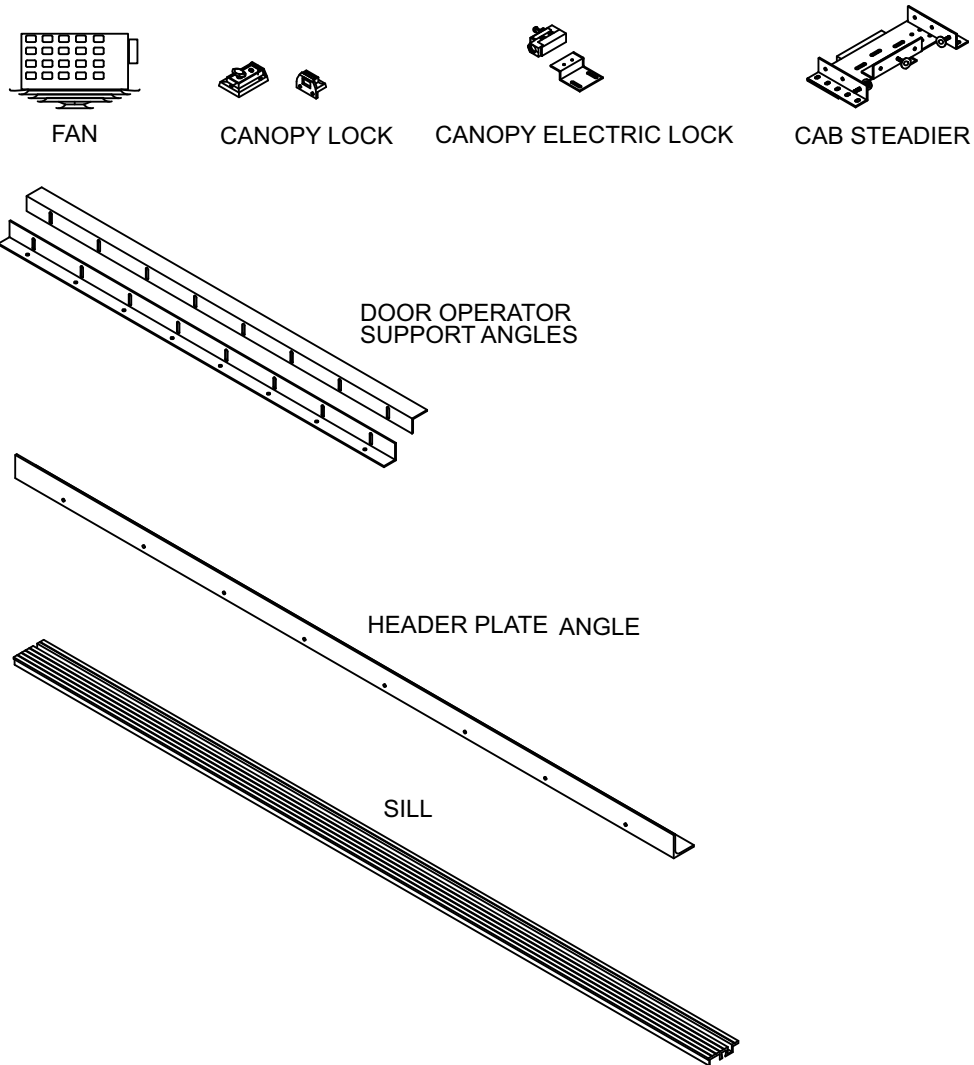
STRIKE JAMB: Vertical structure against which door closes.

SHELL PANEL: Wall panel section. Standardized size.

CORNER SHELL PANEL: Cab wall corner. Sized as needed per car.

TRANSOM: Cab front, top horizontal structure provides mounting shelf for door angle.

Figure 4.28 Miscellaneous Exterior Components



Note

Your equipment may be different, always follow the installation drawings.

Figure 4.29 Miscellaneous Interior Components

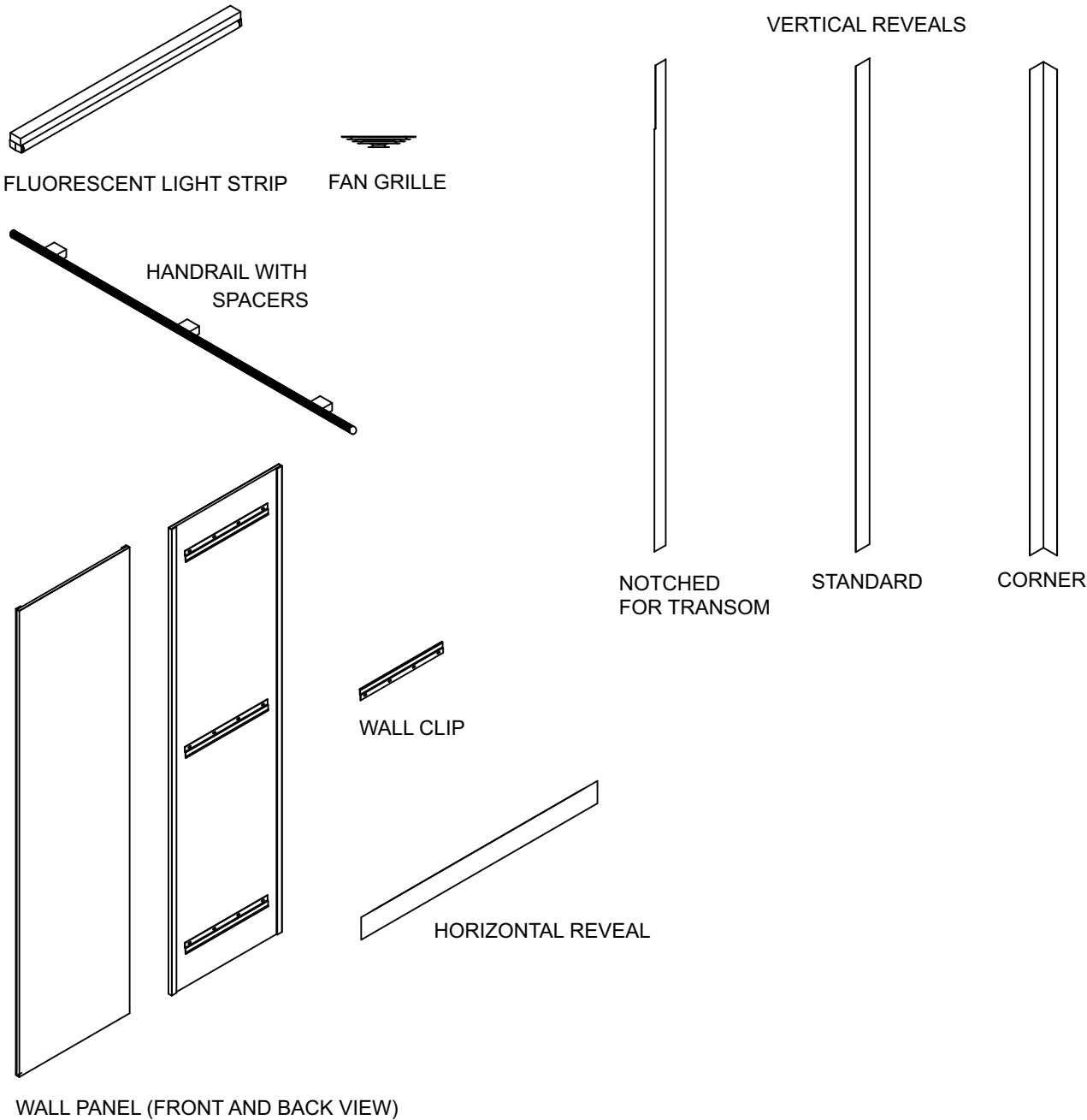
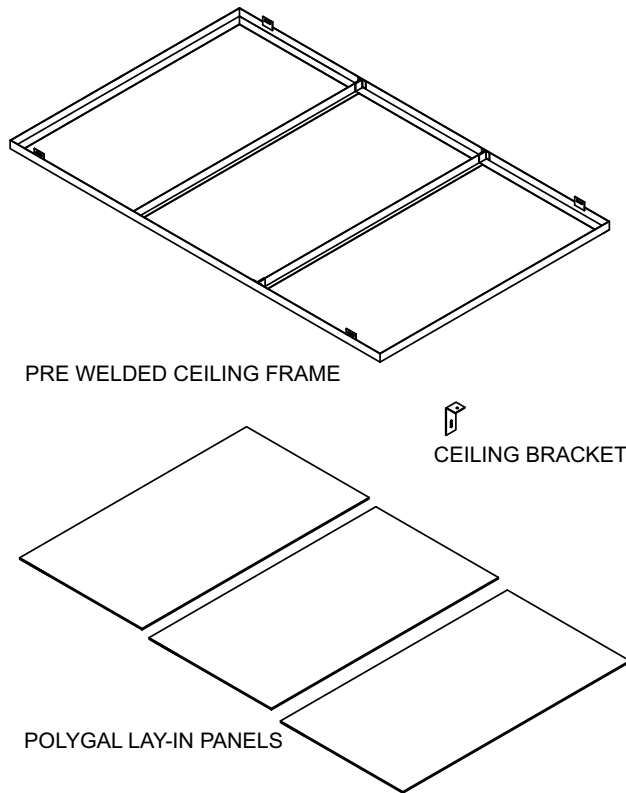


Figure 4.30 Standard Ceiling Frame Components



Note: Ceiling type shown is MCE standard. Refer to job specific cab drawings for ceiling details for each job.

Figure 4.31 Sill Attachment

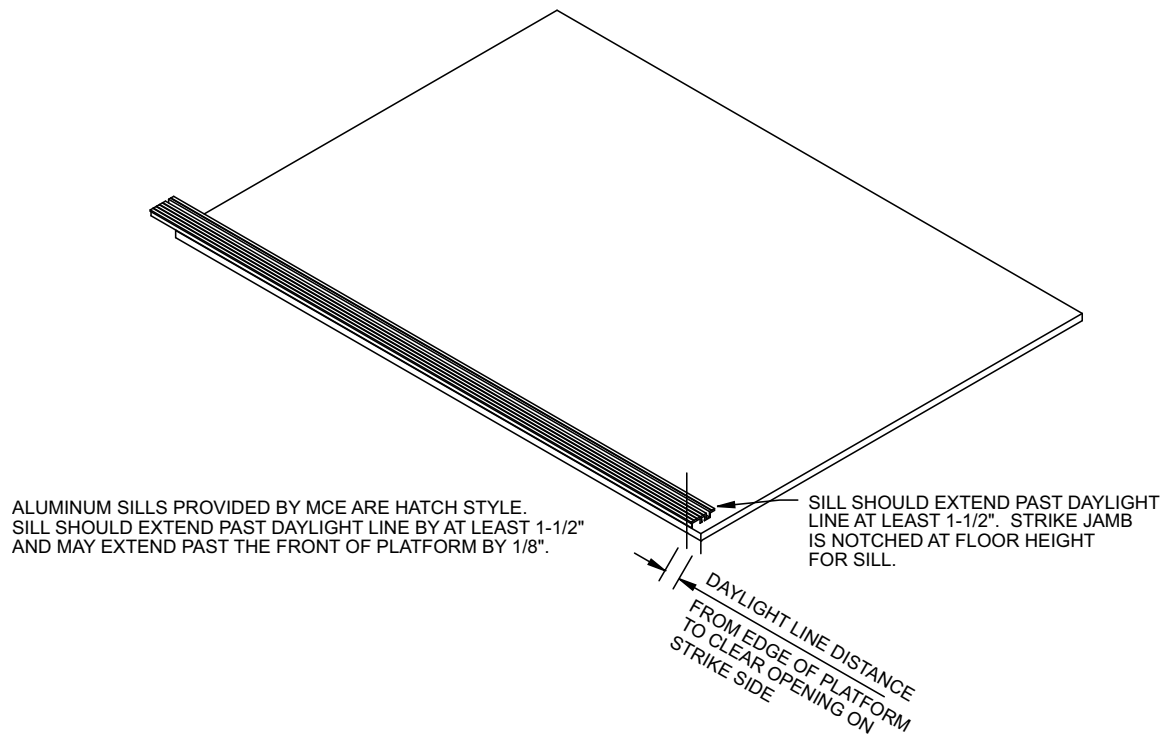
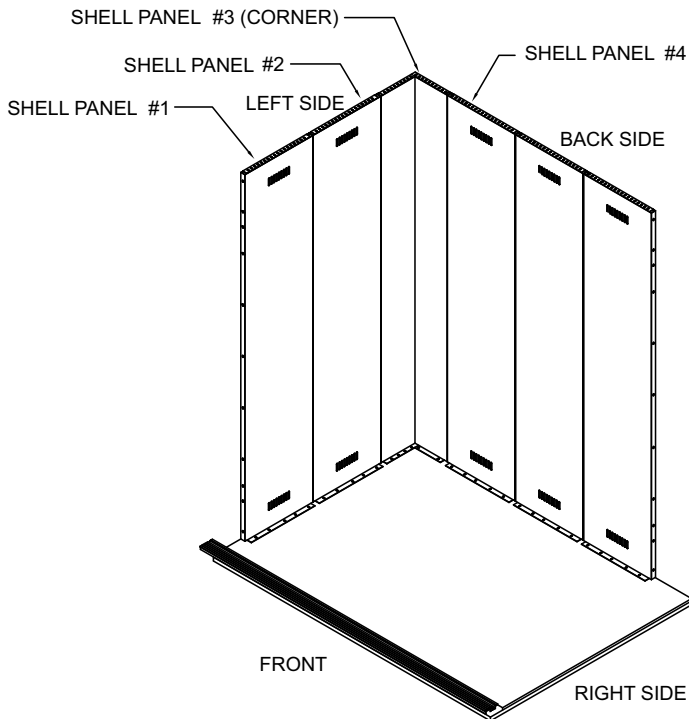


Figure 4.32 Vertical Panel Attachment

PANELS ARE NUMBERED FOR ATTACHMENT. IF INTERIOR PANELS ARE SUPPLIED, NUMBERING IS LOCATED ON FINISH SIDE OF PANEL. IF PANEL IS VISIBLE OR IF NO INTERIOR PANELS SUPPLIED, MARKING WILL BE ON BACK. PANEL MARKING STARTS ON LEFT SIDE.

NUMBERING ON THIS PAGE IS EXAMPLE ONLY. CORRECT NUMBERING WILL BE ON PAGE ATTACHED TO PROJECT PLAN VIEW.



SHELL PANELS ARE FABRICATED WITH FLOOR THICKNESS INCLUDED. (i.e. CAB HEIGHT 96", FLOOR HEIGHT 1/4", TOTAL PANEL HEIGHT 96-1/4")

IF INTERIOR PANELS ARE TO BE APPLIED THE NATURAL VENT SLOTS ARE RAISED TO BE CONCEALED BY THE INTERIOR PANELS.

CORNER PANELS IN MOST CASES ARE FORMED 90 DEGREES. ALL PANELS ARE NUMBERED ON BACK OR FRONT. NUMBERING STARTS FROM LEFT SIDE FRONT.

PANELS ARE ATTACHED TO EACH OTHER WITH SUPPLIED 1/4-20 NUTS AND BOLTS. ATTACHMENT TO PLATFORM IS WITH SUPPLIED FLAT HEAD WOOD SCREWS.

IT IS IMPORTANT TO REMEMBER TO ATTACH PANELS BY THE NUMBERS. IF INTERIOR PANELS AND HANDRAILS ARE PART OF PACKAGE, OR IF MODIFICATIONS WERE MADE DURING SHOP SETUP PRE-DRILLED HOLES MAY BE MISALIGNED.

Figure 4.33 Front Return Attachment

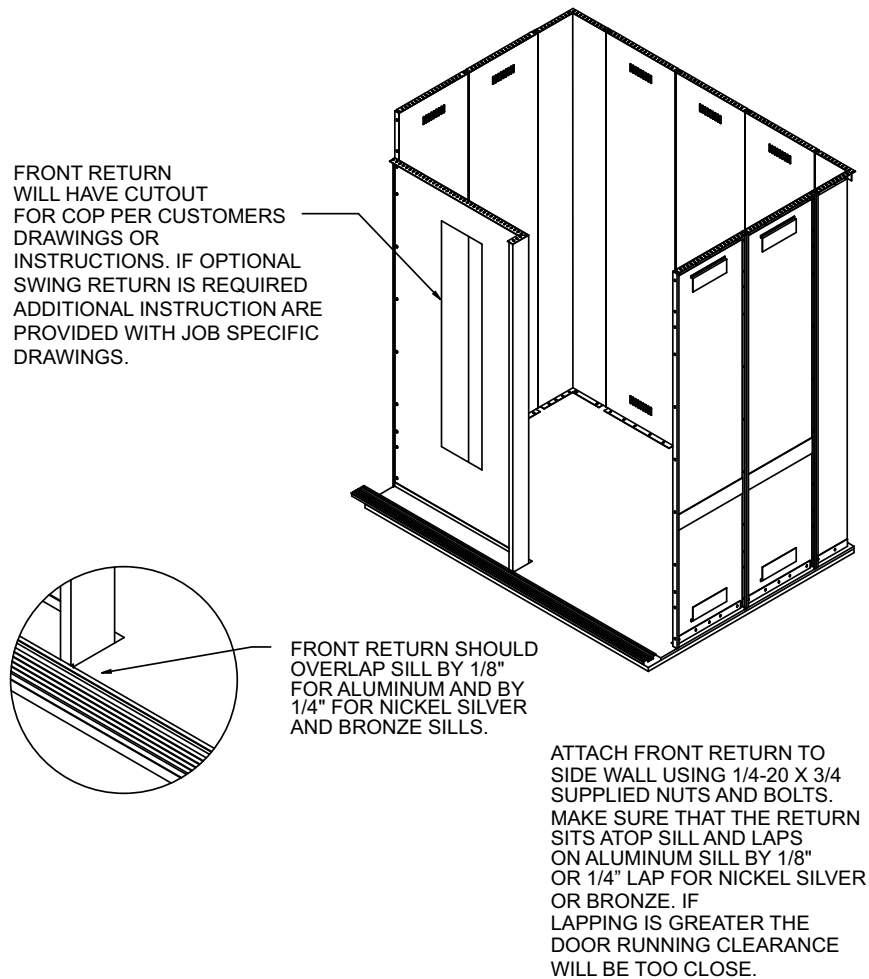
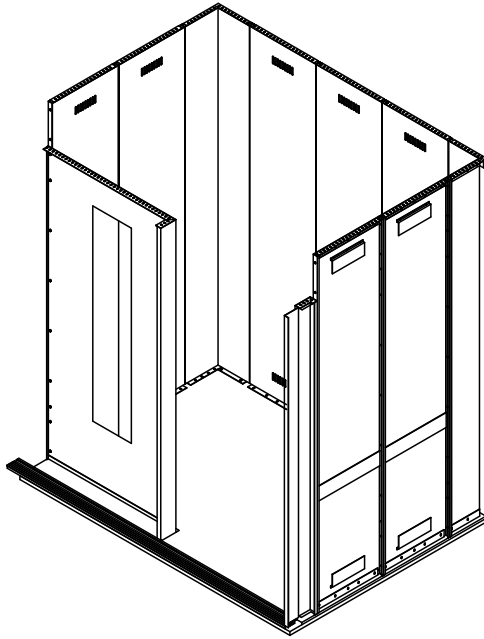


Figure 4.34 Strike Jamb Attachment

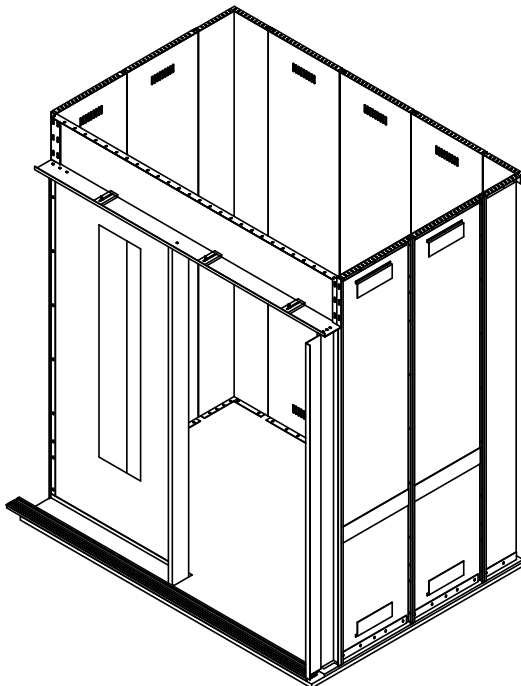


ATTACH STRIKE JAMB TO SIDE WALL USING SUPPLIED 1/4-20 X 3/4" BOLTS AND NUTS.

ALIGN STIKE WITH DAYLIGHT LINE. MAKE SURE STRIKE JAMB IS 1/8" LAP OVER SILL FOR ALUMINUM OR 1/4" FOR NICKEL SILVER OR BRONZE.

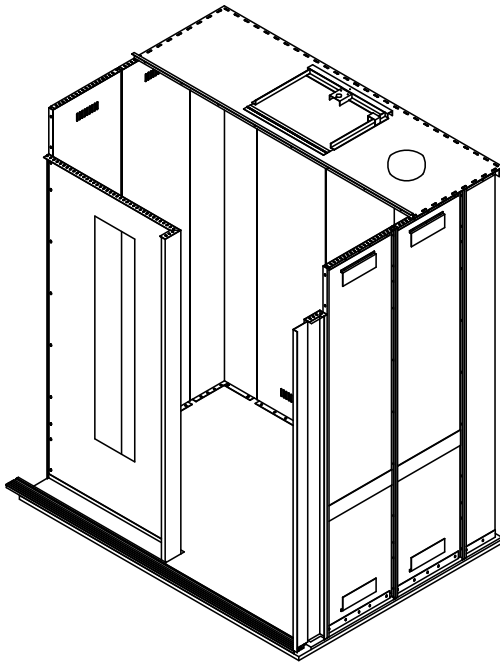
STRIKE JAMB AND FRONT RETURN SHOULD BOTH SIT ON THE CAR SILL AT THE SAME DISTANCE.

Figure 4.35 Transom Attachment



ATTACH TRANSOM TO SIDE WALL PANELS, JAMB STRIKE, AND FRONT RETURN USING SUPPLIED 1/4-20 NUTS AND BOLTS. SQUARE CAB AND ATTACH SHELL PANEL FLOOR ANGLES TO PLATFORM USING SUPPLIED WOOD SCREWS.

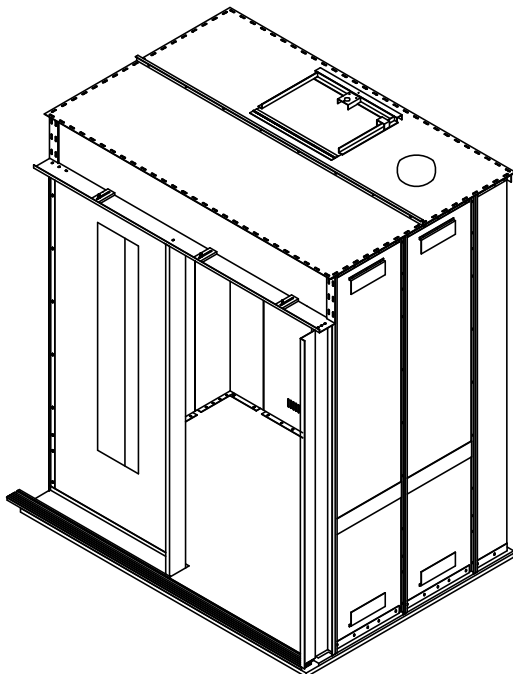
Figure 4.36 Back Canopy Attachment



PLACE BACK CANOPY SECTION ON SIDE AND BACK WALL. INSERT 1/4-20 BOLTS THROUGH SLOTS OF CANOPY AND HOLES ON TOP ANGLE OF WALL PANELS.

PLACE ADEQUATE NUMBER OF BOLTS, NO LESS THAN 4. ATTACH NUTS BUT DO NOT TIGHTEN.

Figure 4.37 Front Canopy Attachment



SLIP FRONT CANOPY SECTION UNDER ANGLE OF BACK CANOPY. ATTACH TO BACK CANOPY SECTION BY ALIGNING HOLES ON FLANGE AND ANGLE OF CANOPY SECTIONS. ATTACH USING 1/4-20 BOLTS AND NUTS. MAKE SURE CANOPY SECTIONS ALIGN WITH SHELL TOP ANGLES AND TRANSOM ANGLE (THERE MAY BE SOME VARIANCE IN DEPTH).

APPLY 1/4-20 BOLTS IN SLOTS (NOT ALL SLOTS WILL ALIGN) AND TIGHTEN NUTS TO SECURE. CABS HAVE BEEN STOOD UP PRIOR TO SHIPMENT AND IF MORE ATTACHMENT LOCATIONS ARE REQUIRED, THEY WILL BE PREDRILLED BEFORE TAKE DOWN.

IF CAB SHELL IS LONGER AND REQUIRES MULTIPLE CANOPY SECTIONS, IT IS RECOMMENDED THAT YOU FOLLOW THESE PROCEDURES FOR ATTACHMENT.

Figure 4.38 Cab Top Items

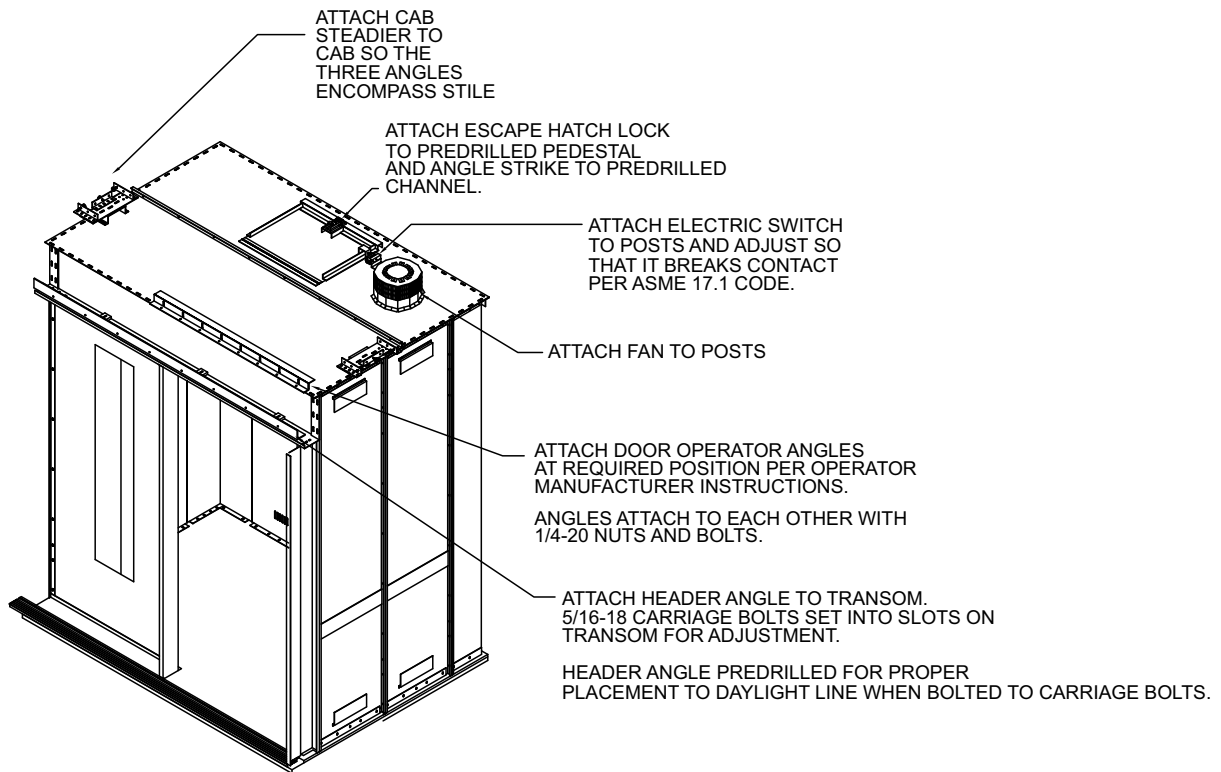
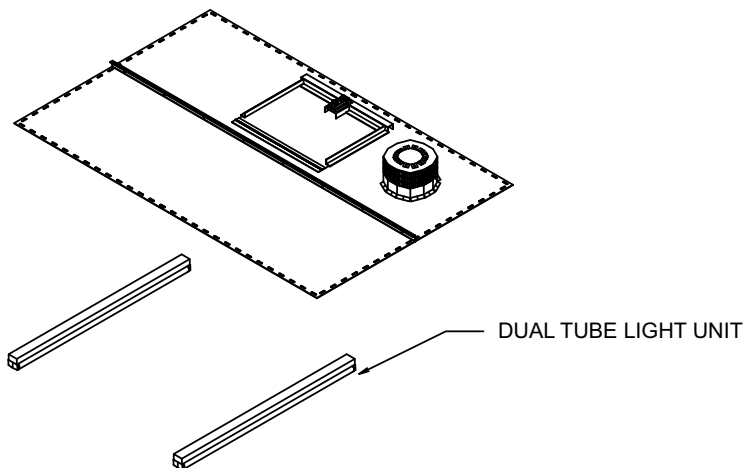


Figure 4.39 Interior Lights

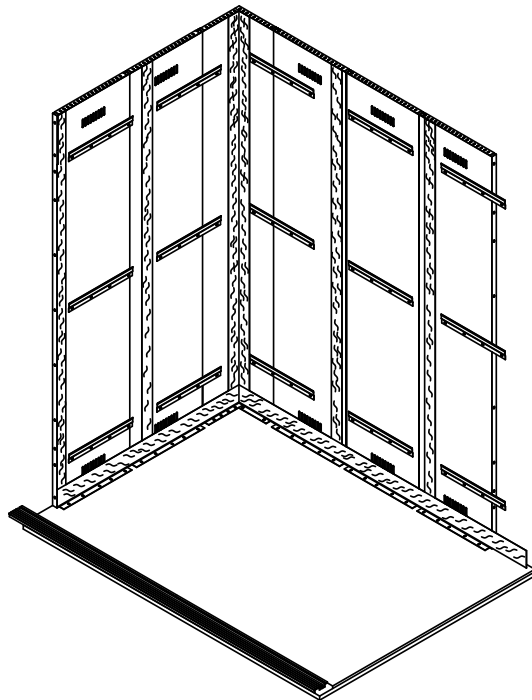


NO PREDRILLING IS DONE ON LIGHT UNITS SO THAT OPTIMAL MOUNTING POSITION MAY BE DETERMINED AT SITE.

2 DUAL TUBE LIGHT FIXTURES SUPPLIED PER CAB UNIT UNLESS OTHERWISE SPECIFIED.

REFER TO JOB SPECIFIC CAB LIGHTING DRAWINGS.

Figure 4.40 Wall Clip and Reveal Placement



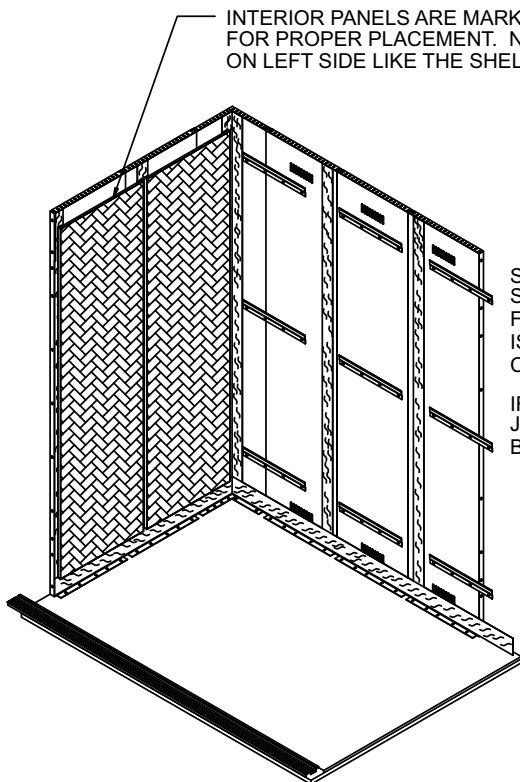
ATTACH WALL PANEL CLIPS USING #10 SHEET METAL SCREWS TO PREDRILLED HOLES. CLIPS SHOULD BE FACING UP SO WALL PANELS MAY SLIP DOWN INTO SPACE ON CLIP. STANDARD APPLICATION IS 3 CLIPS PER PANEL.

ATTACH REVEAL PIECES WITH DOUBLE SIDED TAPE ALREADY APPLIED TO BACK SIDE OF REVEAL STRIPS.

BASE REVEAL IS APPLIED FIRST AT FLOOR HEIGHT. VERTICAL REVEAL STRIPS ARE SET ON EDGE OF HORIZONTAL STRIP. CORNER REVEAL FORMED AT 90 DEGREES AND FRONT REVEAL NOTCHED SO AS TO FIT TIGHT TO TRANSOM THAT JUTS OUT FROM RETURN AND STRIKE JAMB BY APPROXIMATELY 1/4".

SHELL PANELS ARE MARKED FOR LOCATION OF REVEAL. REVEAL MADE WIDER THAN AREA BETWEEN FINISHED WALL PANELS.

Figure 4.41 Interior Panel Attachment



INTERIOR PANELS ARE MARKED ON BACK SIDE FOR PROPER PLACEMENT. NUMBERING BEGINS ON LEFT SIDE LIKE THE SHELL PANELS.

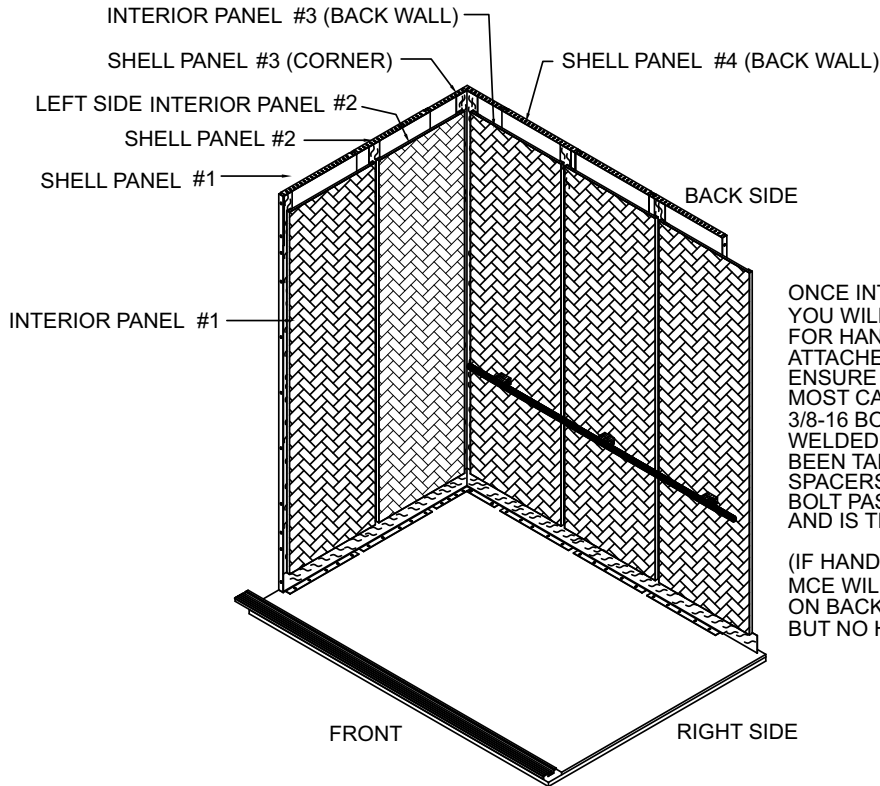
SLIDE WALL PANELS ONTO MOUNTED CLIPS. SLIDE HORIZONTALLY TO DISTANCE REQUIRED FOR REVEAL SPACING (MCE STANDARD IS 1" REVEAL BETWEEN PANELS EXCEPT AT CORNERS. CORNER DISTANCES MEASURE 1-3/4" FROM WALL).

IF DESIRED A SCREW MAY BE DRILLED INTO SHELL JUST ABOVE PANEL TO SECURE PANEL FROM BEING LIFTED OFF.

Figure 4.42 Handrail Attachment

CAB SHELL MARKING AND
INTERIOR PANEL MARKING
FOR ASSEMBLY START FROM
LEFT END SIDE.

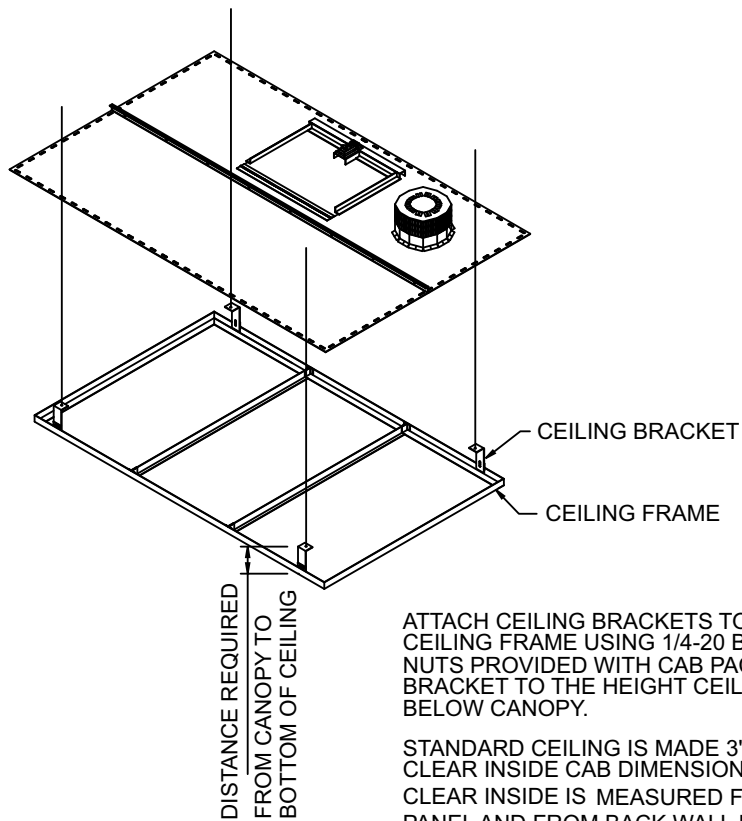
MARKING IS EXAMPLE ONLY
CORRECT MARKING FOR PROJECT
WILL BE SHIPPED WITH PLAN VIEW
OF PROJECT



ONCE INTERIOR PANELS HAVE BEEN PLACED YOU WILL NOTICE HOLES PREDRILLED FOR HANDRAIL(S). HANDRAILS HAVE BEEN ATTACHED DURING FABRICATION TO ENSURE ACCURATE PLACEMENT. IN MOST CASES HANDRAIL SPACERS USE 3/8-16 BOLT. BACKING PLATES ARE PRE-WELDED ONTO BACK OF SHELL PANELS AND HAVE BEEN TAPPED FOR ACCEPTANCE OF HANDRAIL. SPACERS ARE WELDED ONTO HANDRAIL. BOLT PASSES THROUGH HOLE ON SPACER AND IS THEN TIGHTENED.

(IF HANDRAILS ARE SUPPLIED BY OTHERS MCE WILL WELD BACKING PLATES ON BACK SIDE OF SHELL PANELS BUT NO HOLES WILL BE DRILLED.

Figure 4.43 Drop Ceiling Attachment



ATTACH CEILING BRACKETS TO INSIDE OF CEILING FRAME USING 1/4-20 BOLTS AND NUTS PROVIDED WITH CAB PACKAGE. ADJUST BRACKET TO THE HEIGHT CEILING IS TO DROP BELOW CANOPY.

STANDARD CEILING IS MADE 3" SMALLER THAN CLEAR INSIDE CAB DIMENSIONS. FOR CEILING POSITIONING, CLEAR INSIDE IS MEASURED FROM INTERIOR PANEL TO INTERIOR PANEL AND FROM BACK WALL INTERIOR PANEL TO TRANSOM.

CEILING FRAME SHOULD BE PLACED TO HAVE 1-1/2" REVEAL ON ALL SIDES.

PLACE FRAME TO CANOPY AND DRILL HOLES FOR BRACKET. ATTACH WITH 1/4-20 NUTS AND BOLTS.

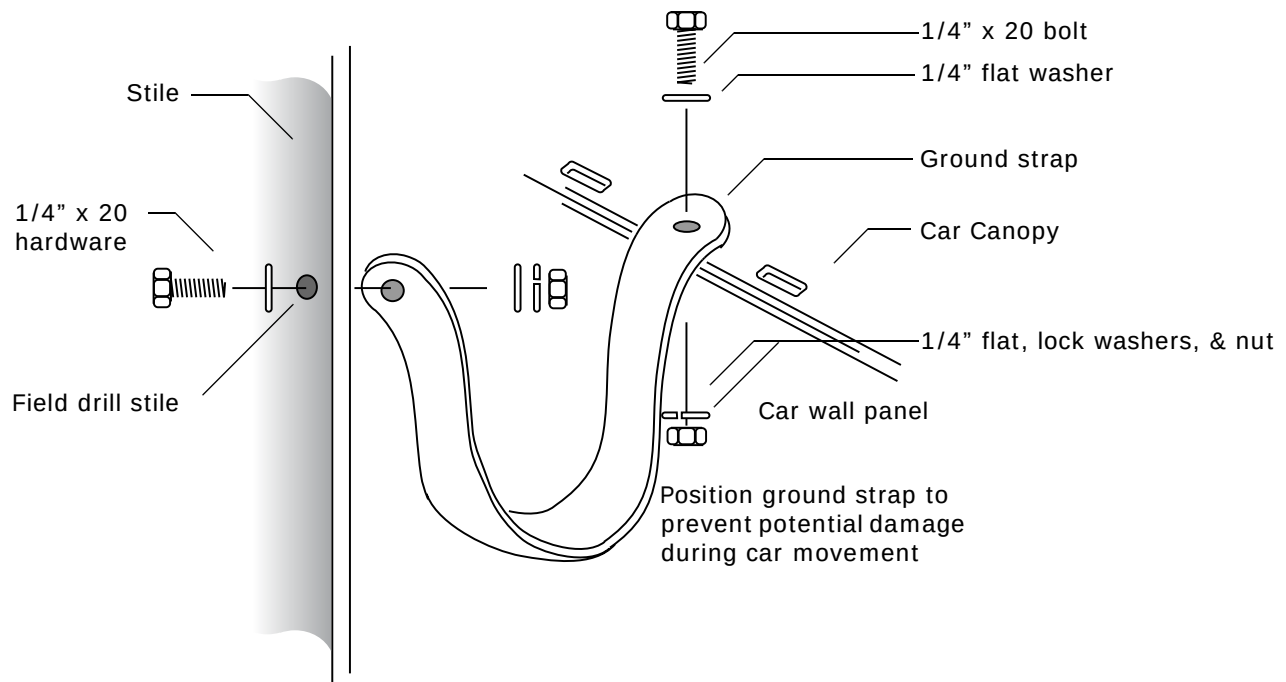
(IF CEILING WITH DOWN LIGHTS PROVIDED HOLES WILL BE PREDRILLED FOR CEILING BRACKETS.)

SLIDE POYGAL DIFFUSER PANELS INTO FRAME.

Cab Grounding

Passenger safety demands that the elevator and car structures be firmly grounded. MCE provides grounding straps as required; one to install from a car rope shackle to the hitch plate (Please refer to “Shackle Grounding” on page 3-30), one to ground the machine (if required), and one to install between the car and the platform stile.

Figure 4.44 Car Grounding Strap Installation



- Remove the paint from the stile (around the hole drilled to attach the strap) to allow a proper ground path.

Cab Interiors

Standard cab interiors are vertical, horizontal, or vertical/horizontal plastic laminate panels with stainless reveals and base as agreed upon. If desired, MCE can provide a “cab shell only” unit to accommodate independently contracted interiors.

Standard lighting is fluorescent or down light as agreed upon. Standard floors are vinyl or carpet as agreed upon. Flooring is supplied by others. The finished floor thickness, confirmed during shop drawing generation phase, is indicated on the cab construction drawings. The cab sill(s) is pre installed for the floor thickness approved.

Standard fixtures are one of several, traditional, locking panel designs as agreed upon. For MCE provided interiors, complete drawings are provided. Drawings provide instruction and material descriptions as well. Review cab dimensions and materials shown on the cab construction drawings carefully. Per job, many mechanical and interior design variations may apply.

Figure 4.45 Cab Interior Drawing Example

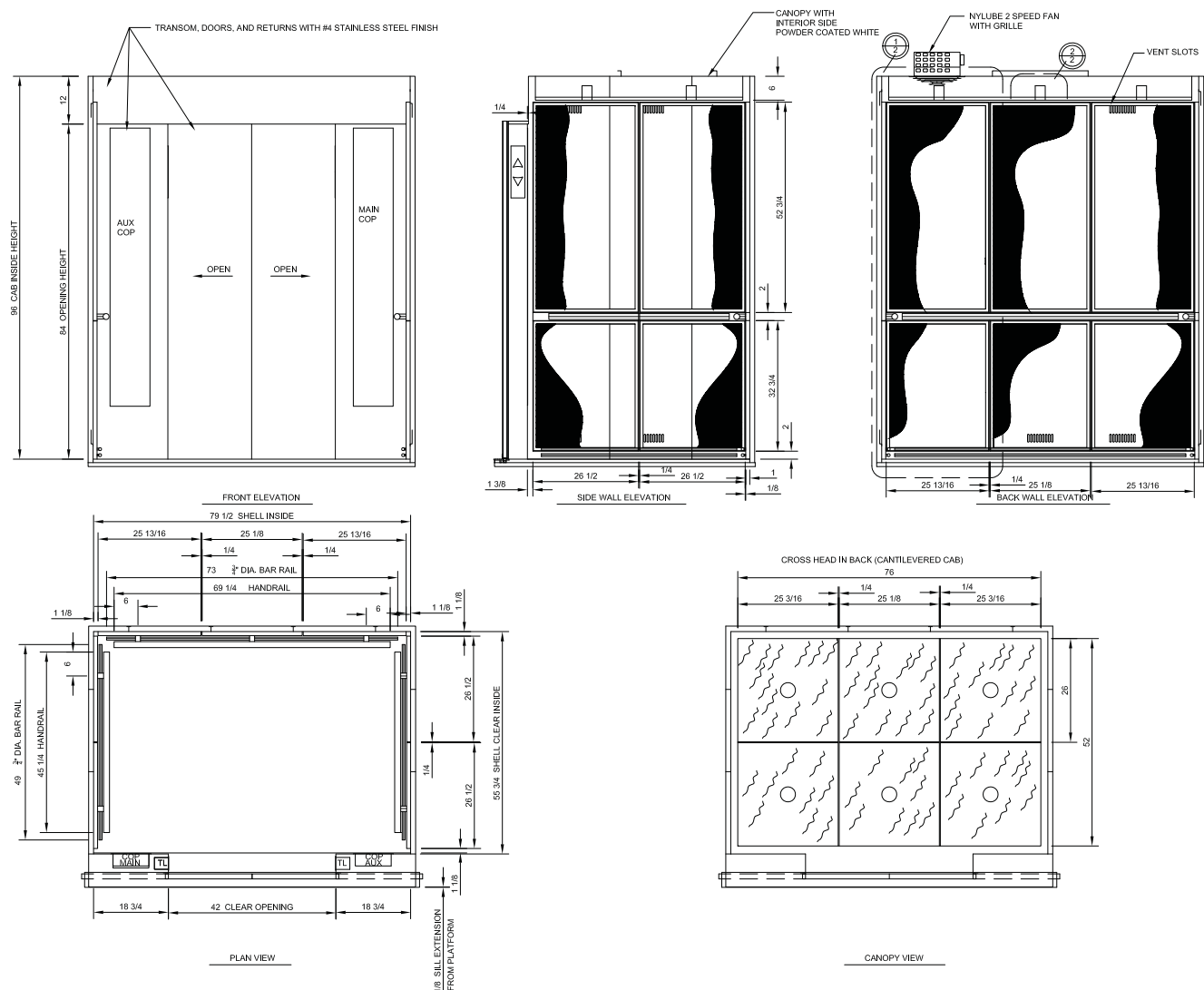


Figure 4.46 Detail of Standard Cab Ceiling Frame Section

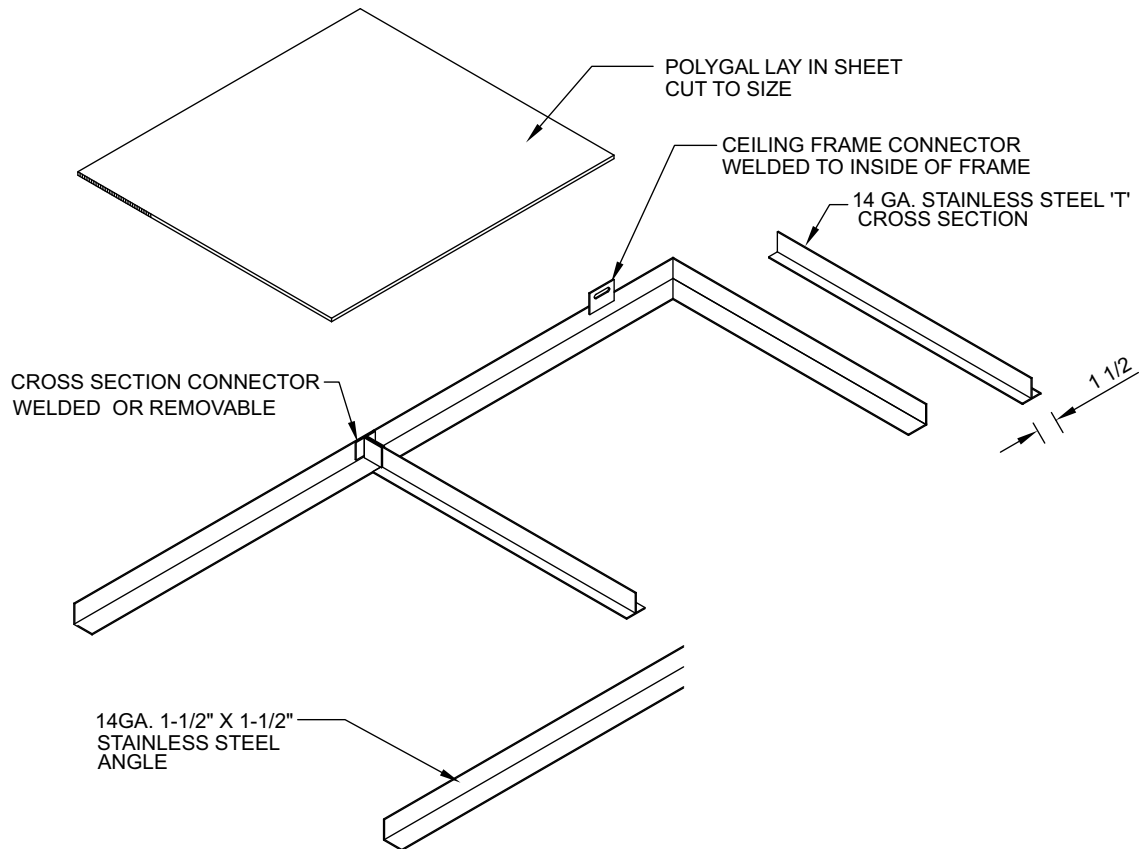
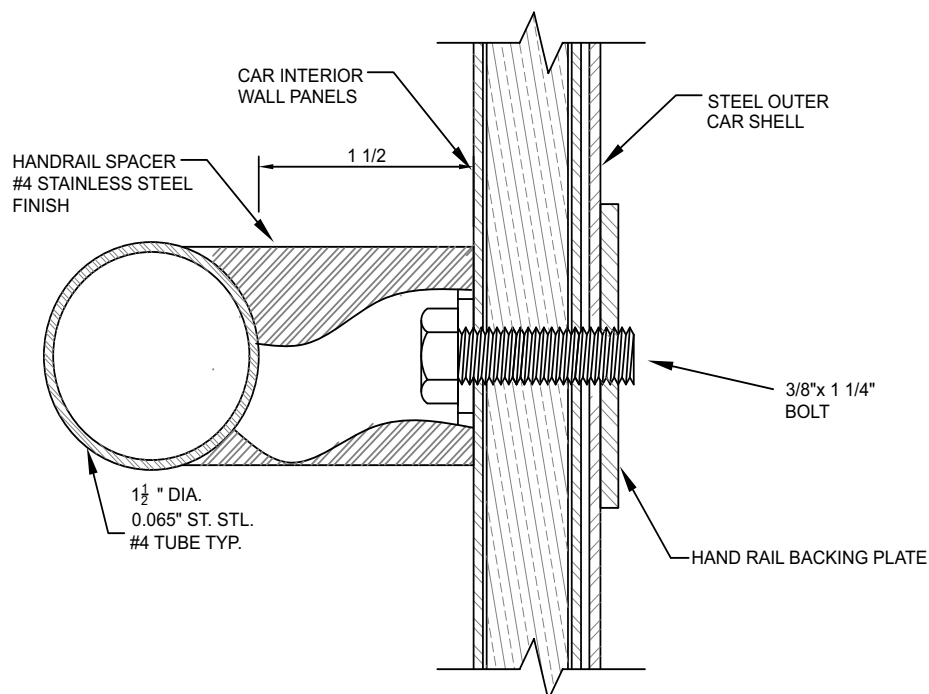


Figure 4.47 Hand Rail Detail



Cartop Handrail

Steel handrail components are provided with every job. Handrails are intended to help prevent falls from the cartop.



Danger

Never climb on handrails. They are not intended to bear weight and may collapse or deform allowing injury or death due to a fall or contact with hoistway structures.

Cartop Station

Cartop equipment includes the cartop inspection operation station, the positioning system, the video rescue camera, the door operator, and the cartop interface box (connections to/from the elevator controller). This section describes installing the inspection operation station and the camera.

- For positioning system installation, please refer to the manual for the controller used on the job.
- For door operator installation, see [Door Operator and Hatch Door Equipment on page 4-47](#) and the door operator manual.
- For cartop interface box installation, refer to the elevator controller manual.

Figure 4.48 Cartop Inspection Operation Station



Typical cartop inspection station. The station shipped with the order may be different depending on hoistway NEMA requirements and job requirements.

1. Install the cartop inspection station as shown in the MCE construction drawings or as site conditions warrant.
2. Wire the cartop inspection station as shown in the controller drawings package.

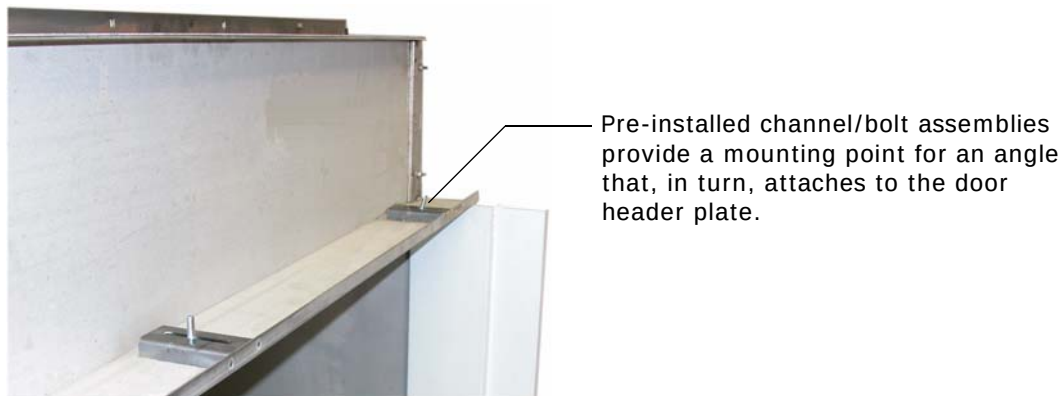
Door Operator and Hatch Door Equipment

Car doors, door headers, hangers, tracks, sill, and additional hardware are provided. Depending upon job specifications, you may receive a GAL, SmarTraq, or other door operator.

Doors and Door Hardware

Standard MCE doors are heavy duty, dual panel doors with pre-tapped door sheave/hanger attachment points. The elevator car transom lower edge is equipped with pre-installed channels to facilitate installing an angle (also provided) that in turn bolts to the header assembly provided with the door operator.

Figure 4.49 Transom Ledge with Header Attachment Channel



Drawings provided with the header assembly show door track, hanger, and hardware installation. The door operator is also provided with instructions for installation and adjustment.

Hall Stations

Install hall station, lantern, and position indicator boxes as shown in the drawing package. Be certain that you are using the proper techniques, per fire safety and wire run guidelines, for the jurisdiction. Wire hall stations, lanterns, and position indicators as shown in the controller job drawings and approved fixture drawings.

Car Operating Panels

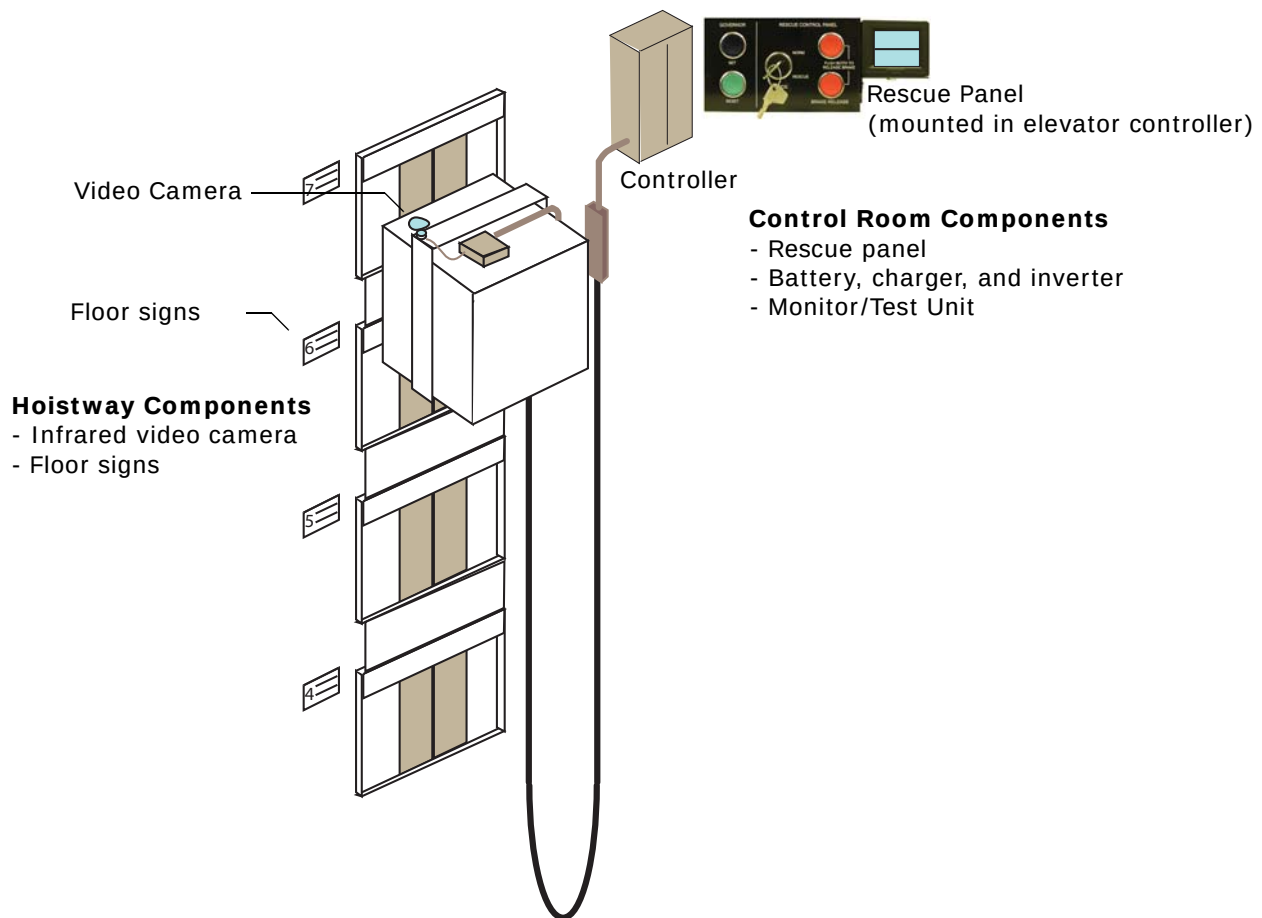
Innovation fixtures are standard with MCE elevator packages. Other manufacturers may have been specified in the job requirements and may be included in the Freedom package or provided by others.

Install car fixtures as shown in the drawings package. Wire fixtures as shown in the controller job prints.

MRL Rescue Assist System

This instruction provides installation and operating instructions for the MCE Rescue Assist System. The manual rescue unit is designed for use with MRL installations where a means is required to electrically lift machine brakes and provide video feedback that will allow a technician to safely drift the elevator car to a landing from outside the hoistway in the absence of commercial electrical power. Additional elements of the rescue system meet code requirements that the rescue system battery be monitored at all times so that the elevator may be stopped at the next landing should the battery drop below required charge during normal elevator operation.

Figure 4.50 Rescue Assist System



Installation

Installation consists of:

- Connecting the battery and the charger
- Mounting and wiring the cartop camera
- Placing the camera and hoistway signs
- Control connections
- PLC setup
- Controller settings

Battery and Charger Connection

Battery and adaptor are shipped disconnected to prevent potential damage. The battery is a lead-acid unit with screw-terminal posts.

1. Power down the system.
2. Install the battery in the holder, terminals facing out. (Typical holder shown below.)



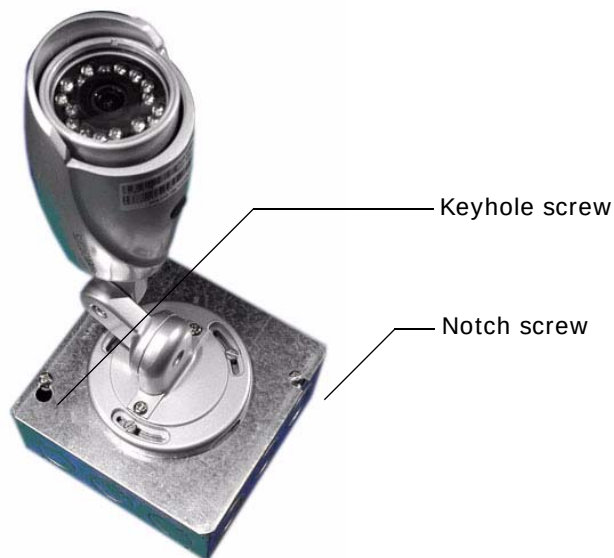
3. Connect the positive terminal first, then the negative.
4. Next, plug the charging adaptor into the labeled 120VAC, single phase, 60 Hz outlet Charger Only in the controller. Ideally, the battery should be allowed to charge for 24 hours before use.



Wiring the Camera

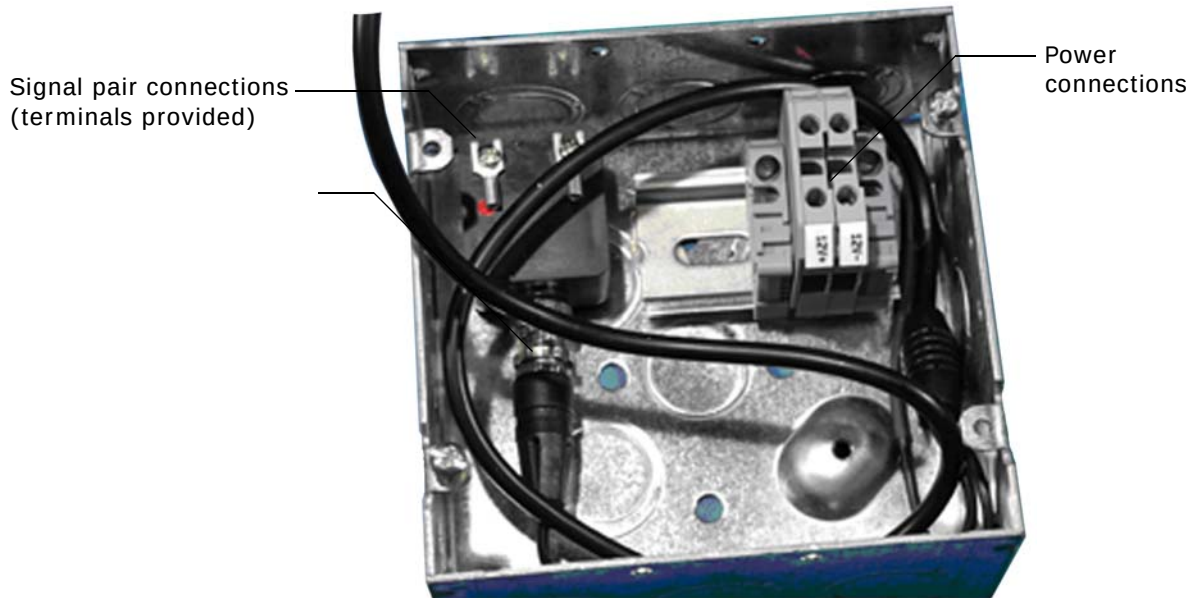
The camera requires four connections from the elevator controller.

- Two 18 AWG wires for power (+12 VDC and -12 VDC)
 - A twisted pair (shielded is best) for the video signal (RG 59U or similar coax may be used)
1. Loosen the two retaining screws and remove the camera and base plate from the electrical box. Be careful. The camera is wired to components in the box.



2. Remove an appropriate knock-out and set it up for conduit connection.
3. Cut a length of conduit that will allow connection to the cartop interface box plus sufficient length to adjust the camera position on the cartop when you are setting up the camera and hoistway signs later.
4. Connect power wires from the traveler cable to the 12V+ and 12V- terminals in the camera electrical box.

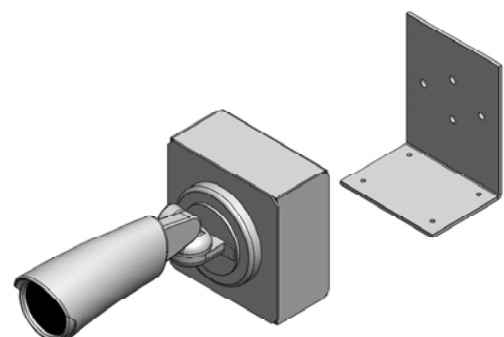
5. Connect a shielded, twisted-pair from the traveler cable to the two screw terminals on the BNC-terminating Balun in the camera electrical box (fork/spade connections). Because they are low voltage, DC, you can run the twisted-pair in the same conduit as the camera power wires.



6. Make camera power and signal connections at the controller end as shown in the wiring prints.

Placing the Camera and Hoistway Signs

1. Pick a hoistway location for the signs that is clear and usable at all floors.
2. Bring the car level at a selected floor.
3. Position a sign in the hoistway at a measured distance above the level-at-floor location and at a measured horizontal offset from the entrance, and centered in the camera field of vision.
4. Mount the camera on the car in an appropriate location. (You can make tilt and rotation adjustments later using the tool you received with the camera.)

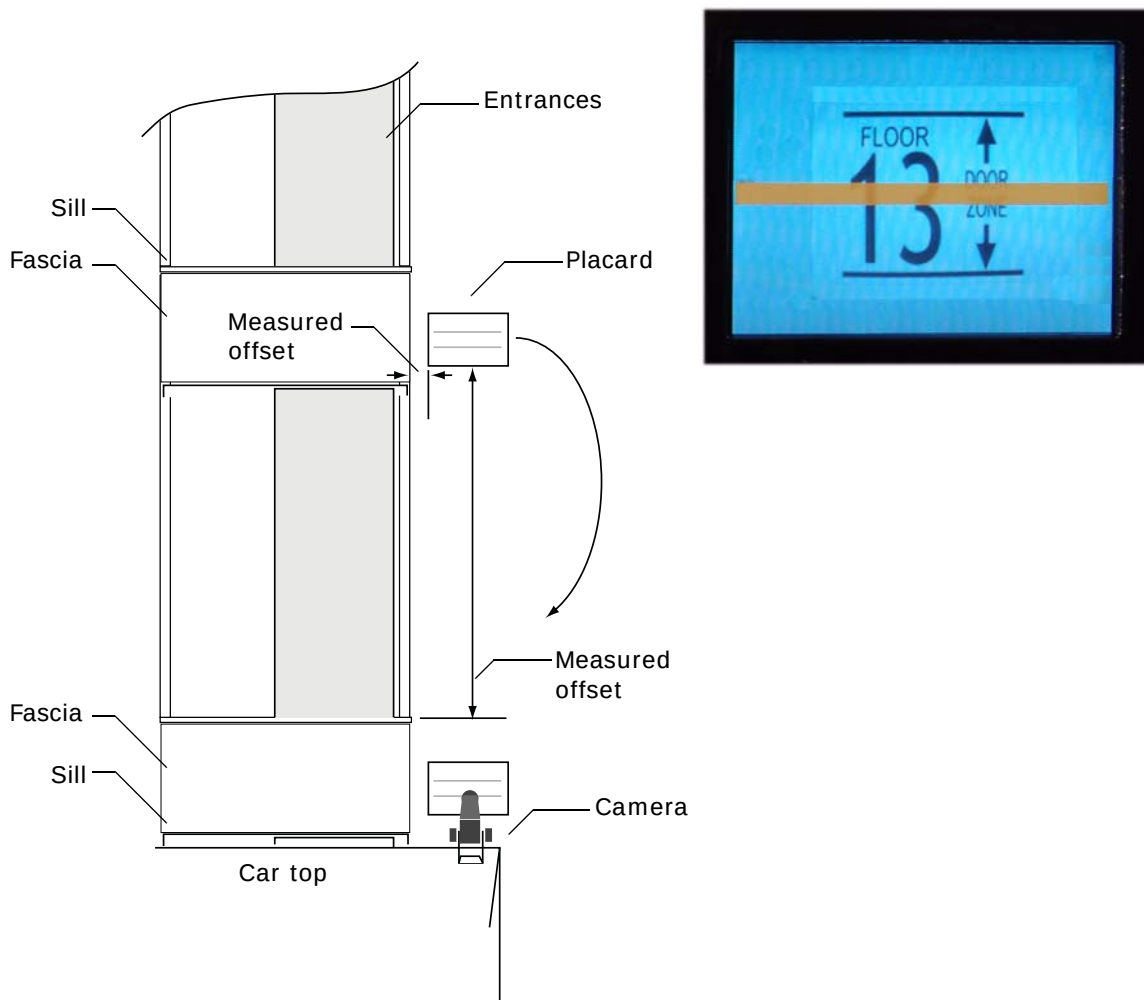


A mounting bracket is provided for the camera junction box

5. Secure the sign in place.

6. View the sign markings on the LCD in the controller and have a technician on the cartop adjust the camera position until the horizontal stripe on the LCD is centered between the door zone top/bottom lines on the sign.
7. Place additional signs for each floor at the measured vertical and horizontal offsets.
8. Test to ensure that the car is level at each floor when shown to be by the LCD screen.

Figure 4.51 Rescue Assist Labels



Control Connections

1. Refer to the job prints.
2. Make brake lifting and governor set/reset connections as shown.

Programmable Logic Controller Setup

The Programmable Logic Controller (PLC) is the monitoring and control unit for the manual rescue system. The PLC monitors the condition of the battery that powers the brake lifting and video components when in rescue mode. If the battery falls below an adequate level, the PLC will stop a normally operating car at the next available landing and not allow it to restart until the battery level is corrected.

The PLC also runs a battery and battery charger test once a week (10PM, Sunday evening). Test time may not be directly changed. When you set the system clock in the PLC, it cues from this setting to “know” when to run the test. (If you do not set system time, the test will still be run but not at the programmed time.) The self-test will not disturb the normal operation of the elevator.



The PLC has four relay contact outputs. Two are used for charger and battery load control; the other two are for battery fault and charger fault. If a battery or charger fault occurs, a signal is sent to the controller to stop the car at the next landing and take it out of service.

- With the controller powered, verify that the DC OK LED on the power supply next to the PLC is illuminated.
- Verify the PLC screen displays RUN, the day of the week and the time. For example, FR10:24 indicates Friday at 10:24.

Default Language

The default display language is English. Five other choices are available.

1. Press OK to open the Menu screen.
2. Press the Down arrow until Language is highlighted.
3. Press OK to display the current language (English).
4. Press Up and/or Down arrows to highlight a different language.
5. Press OK to display a confirmation message.
6. Press OK again to set the new language for the display.

Date and Time

1. Press OK to open the Menu screen.
2. Press the Down arrow until Set Clock is highlighted.
3. Press OK to display current settings. (Right digit of date will be highlighted and flashing.)
 - Use Left/Right arrows to move the cursor.
 - Use Up/Down arrows to change value.
 - Use OK to change from highlighted to flashing (ready to change) cursor.
 - Press OK again to display the confirmation message when ready to save.

If the PLC is without power for more than two days, it will lose time and date information and they will need to be set again.

About the Self Test

With the PLC clock properly set, the automated, weekly, self-test will begin each Sunday night at 10:00 PM. The elevator will continue to run normally. The test takes about one hour. The test progression is:

- Logically disconnect the charger
- Monitor unloaded battery voltage
- If voltage is sufficient, conduct four minute load test while monitoring voltage
- If voltage remains above threshold of 11.55 volts, reconnect charger, conclude test
- If voltage falls below threshold of 11.55 volts
 - disconnect load
 - set battery and charger fault flags
 - run battery charger for one hour
 - test battery voltage above “charger on” voltage of 13.3 volts
 - if 13.3 volts or more, clear fault flag, conclude test
 - if less than 13.3 volts, set charger fault flag, conclude test

If a Fault is Not Cleared If a fault is not cleared during test, the PLC will wait until the test is concluded and then set the (¹Power Transfer Input) PTI input to the controller causing the car to stop and remove itself from service at the next landing (or the current landing if the car is not moving).

To Initiate a Self-Test You can initiate a four minute load test by pressing the OK button on the PLC. When the test is successfully concluded, the PLC reverts to normal running. If the battery voltage falls below the preset 11.55 volt threshold, the battery fault flag will be set.

Reset Faults Press the ESC button on the PLC to reset (PLC) flags.

Set to Normal Operation Press the “3” button on the PLC to reset it to normal operation, ending any test in progress.

1. The Power Transfer Input is a user-programmable, “spare” input to Motion 4000 controllers. If the rescue unit was installed by MCE, the input is factory programmed. If not, you should verify that the PTI input is assigned to a physical connection. The PTI input is also used to transfer to and from emergency power.

Passenger Rescue Operation



Danger

This system is for emergency use by qualified elevator personnel only. The rescue system will move the car regardless of the state of the door locks or safety string. It unconditionally picks the brake. The machine windings are shorted so the car will not “run away.”

The goal is to move the car until the horizontal bar on the rescue panel LCD screen is centered between the horizontal bars on a hoistway sign. At that point, the car is in the leveling zone for that floor.

1. Open the mainline disconnect for the elevator.
2. If possible, determine the location of the car in the hoistway and make contact with any entrapped passengers. (Determining how many passengers are in the car will help you know which way the car will probably drift.)
3. Verify all car and hoistway doors closed and that the hoistway is clear.
4. Insert the key in the rescue panel and set it to RESCUE. The LCD screen should light and display the camera's view of the hoistway. (If not, check the unit is ON [switch on side of LCD] and brightness/contrast adjustments on top until view is clear.)
5. Simultaneously press both of the BRAKE RELEASE buttons. The brakes will lift and the car will begin to drift. (You may want to do this just briefly at first to get a feel for how the car will move. The shorted motor windings should restrict speed to about ten feet per minute.)
6. Continue holding the BRAKE RELEASE buttons. The camera view will give you a clear idea of car speed and direction.
7. When the door zone sign in the hoistway comes into view, you may want to begin bumping (pressing and releasing the BRAKE RELEASE buttons for short durations) to be certain you do not overshoot the door zone.
8. Move the car until the horizontal bar on the rescue panel LCD screen is centered between the horizontal door zone bars on the hoistway sign.
9. The car is now in the door zone at the indicated floor and the doors may be manually opened to release passengers.
10. When rescue is complete, close the doors and return the key switch to the NORMAL position. The car will resume normal operation when commercial power is restored.





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Operation, Preinspection, OEM Inclusions

In this section

This section provides information important to elevator operation but not pertaining specifically to installation:

- Car Locking Bolt Operation [5-2 ->](#)
- Passenger Rescue Device [5-3 ->](#)
- PMAC Machine Information [5-5 ->](#)
- Acceptance Tests [5-6 ->](#)
- Data Plates and Signs [5-7 ->](#)
- Preinspection checklist [5-10 ->](#)
- OEM Information Inclusions [5-13 ->](#)

Car Locking Bolt Operation

With the machine and governor located in the overhead, it is necessary to provide a means to lock the car in position and inhibit machine and brake operation so that maintenance can be safely completed from the car top. Refer to [Car Top Locking Bolt, MRL Applications on page 3-50](#) for mechanical information.



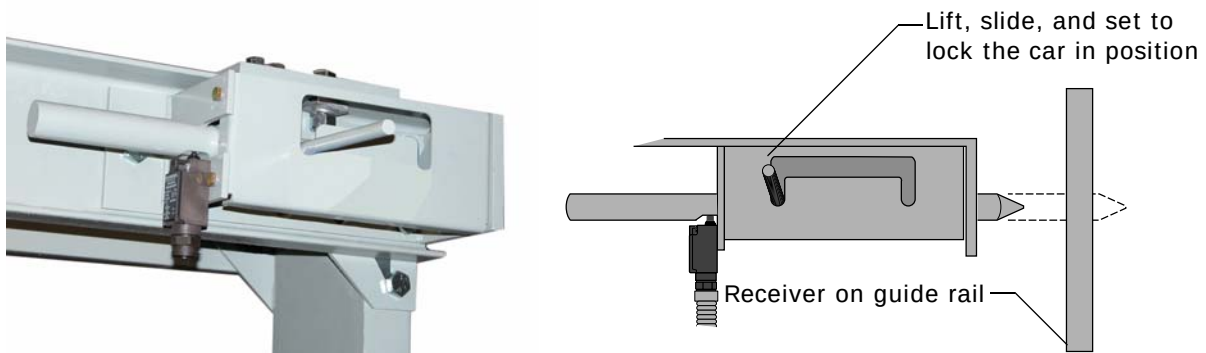
Danger

Suspension ropes must be in place when using the car locking bolt.

1. Run the car to the top landing.
2. Prevent access to the car by unauthorized personnel. Post warnings and place barriers as required.
3. Using the key switch in the car, place the car on ACCESS.
4. Move to a safe position in the hallway and use the hoistway access switch to move the car down to the access limit.
5. Using the car top switch, place the car on car top INSPECTION.
6. Observing all safety precautions, step onto the car top.
7. Use car top controls to move the elevator up adjacent to the car locking device.
8. Engage the locking bolt in the center of the bolt hole in the receiver. This will activate a switch, opening the safety circuit and preventing the car from moving.

The car is now prevented from moving by the locking device. Reverse the above steps to return the car to normal service when maintenance is complete.

Figure 5.1 Car Locking Bolt Use



Cartop Access

While the locking bolt is engaged, you may access the cartop through the escape hatch. Be sure to have a step ladder positioned appropriately in the car and a second step ladder in the hall for safe exit and re-entry.

MRL Manual Passenger Rescue Assist System

When commercial power is lost, it is assumed that elevator personnel will establish communication with any passengers trapped in the car and let them know that the car will be safely moved to a floor where the doors will be manually opened and the passengers can exit the car. Once passengers have been alerted, an elevator technician will access the rescue panel located in the elevator controller:

- When the key switch is moved to the RESCUE position, the safety string is opened and the motor is disconnected from the drive. The motor windings are electrically shorted together so that it will provide resistance to motion (electrical “braking”) when the machine brakes are lifted. The battery will provide 12-volt power to the rescue system.

Figure 5.2 Rescue Assist Control Panel



- The LCD screen will display the hoistway wall visible to the car-mounted camera.
- When both BRAKE RELEASE buttons are simultaneously pressed, the inverter will provide power to lift the machine brakes and the car will drift slowly (about 10 feet per minute) up or down the hoistway (depending upon the weight of the car versus the weight of the counterweight).
- As the next hoistway sign moves into view, the technician waits until the horizontal line on the LCD screen is centered between the two horizontal lines on the hoistway sign, then releases the BRAKE RELEASE buttons. The brakes will drop and the car will stop in the leveling zone.
- Rescue personnel can now manually open the doors and allow the passengers to exit.

Note

The battery and inverter can provide about 10 minutes of active brake lifting time. This is more than sufficient to drift the car to a landing.

Passenger Rescue Operation



Danger

This system is for emergency use by qualified elevator personnel only. The rescue system will move the car regardless of the state of the door locks or safety string. It unconditionally picks the brake. The machine windings are shorted so the car will not “run away.”

The goal is to move the car until the horizontal bar on the rescue panel LCD screen is centered between the horizontal bars on a hoistway sign. At that point, the car is in the leveling zone for that floor.

1. Open the mainline disconnect for the elevator.
2. If possible, determine the location of the car in the hoistway and make contact with any entrapped passengers. (Determining how many passengers are in the car will help you know which way the car will probably drift.)
3. Verify all car and hoistway doors closed and that the hoistway is clear.
4. Insert the key in the rescue panel and set it to RESCUE. The LCD screen should light and display the camera's view of the hoistway. (If not, check the unit is ON [switch on side of LCD] and brightness/contrast adjustments on top until view is clear.)
5. Simultaneously press both of the BRAKE RELEASE buttons. The brakes will lift and the car will begin to drift. (You may want to do this just briefly at first to get a feel for how the car will move. The shorted motor windings should restrict speed to about ten feet per minute.)
6. Continue holding the BRAKE RELEASE buttons. The camera view will give you a clear idea of car speed and direction.
7. When the door zone sign in the hoistway comes into view, you may want to begin bumping (pressing and releasing the BRAKE RELEASE buttons for short durations) to be certain you do not overshoot the floor.
8. Move the car until the horizontal bar on the rescue panel LCD screen is centered between the horizontal door zone bars on the hoistway sign.
9. The car is now in the door zone at the indicated floor and the doors may be manually opened to release passengers.
10. When rescue is complete, close the doors and return the key switch to the NORMAL position. The car will resume normal operation when commercial power is restored.



PMAC Machine Information

To properly drive a PMAC machine, the drive must know the absolute position of the rotor at all times in order to electrically commutate the field. This information is captured by the encoder and sent to the drive through a serial link. The encoder on the Imperial PMAC machines used by MCE is an EnDat, Heidenhain encoder.

It is necessary to “learn” the encoder position. If you have any problem with this procedure, please refer to detailed information in the MCE Torqmax F5 manual that accompanied the elevator controller.

Static Learn using KEB/Torquemax Drive

1. Ensure that all motor related parameters have been accurately entered into the drive.
2. Electrically disconnect the machine brake to prevent it from releasing.
3. Set drive LF.3 to SPI and press ENTER. The display will show StArt.
4. Press and hold the Inspection Up key. The motor should not turn. The brake should remain set. The display will show eleven position values from the encoder.
5. When pole learn is complete, the display will show donE. Release the Inspection Up key and make a note of the final position number in drive parameter LF.77. This position number is valid only for this motor and encoder. If the encoder is changed or removed, this process will have to be repeated.
6. Select LF.99. The display will show noP (normal operation) and LF.3 will automatically be set to run. Reconnect the machine brake.
7. Verify encoder position is correct by running the car and monitoring the current (drive parameter LF.93). If current is excessive, the encoder rotation may be incorrect. In this case, change LF.28 from 0 to 1 or from 1 to 0, or from 2 to 3 or 3 to 2 and repeat the alignment process.

Once the data is loaded, you can proceed to auto tuning (calibrating the drive output stage). Please refer to the controller manual for this information (Motion 4000 or iControl as appropriate).



Note

If FAILP is displayed, pole position learning is failing. In this case, refer to the MCE Torqmax F5 manual for detailed information.

Acceptance Tests

Final testing must be successfully completed and certified before the car may be turned over for normal operation. Most of these tests are conducted just as with machine room installations but some are not. The controller manual for the installation describes standard testing procedures. Tests that must be conducted differently with machine roomless installations are described here:

- Passenger Rescue Assist System Test

Rescue Assist System Test

Acceptance tests verify that a system fault will cause the car to stop at the next landing (if running) and take itself out of service.

1. Disconnect the Negative terminal of the battery.
2. Place the car at a terminal landing on normal operation.
3. Press the OK button on the PLC.
4. Wait three seconds, then press the ESC button on the PLC.
5. Place a call to another landing.
6. Press the “3” button on the PLC while the car is running.
7. Verify that the PLC LCD display is showing solid blocks for outputs Q0 and Q2.

The car will run normally to the next landing.

8. Place a call to another landing. The car should not respond.
9. Press the ESC button on the PLC twice. The display should shown only the P0 output on.
10. Reconnect the Negative terminal of the battery.
11. If necessary, reset the controller fault. Verify that the car is again running normally.

Installing Data Plates and Safety Signs

Data plates and safety signs are provided with MCE's Machine Room-Less (MRL) and Overhead Traction (OHT) elevator packages and original equipment manufacturers. This section describes installation of the data plates and safety signs. Applicable ASME A17.1-2007 / CSA B44-07 Requirements are referenced. A copy of the ASME A17.1-2007 / CSA B44-07 Code can be purchased at:

http://catalog.asme.org/Codes/PrintBook/A171CSA_B44_2007_Safety_Code.cfm

Data plates are unique for each elevator, and each elevator is assigned a unique EP number, for example, EP # 000001. Ensure that appropriate data plates are installed on each car.

Capacity Plate

The Capacity Plate, indicating the rated load of the elevator, must be permanently and securely attached in a conspicuous position inside the car. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.16.3.

Crosshead Data Plate

The Crosshead Data Plate contains information about the elevator, e.g., rated load and speed, wire rope data, rail lubrication instructions, etc. It must be permanently and securely attached to the elevator crosshead. Please refer to ASME A17.1-2007 / CSA B44-07, Requirements 2.16.3, 2.17.16 and 2.20.2.1.

Door Operator Data Plate

Attach the Door Operator Data Plate, providing minimum door closing times, to the power door operator or to the car crosshead. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.13.4.2.4.

Suspension Ropes Data Tag

Securely attach a metal data tag, providing suspension wire rope data, to one of the wire-rope fastenings. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.20.2.

Governor Rope Data Tag

Securely attach a metal data tag, providing governor wire rope data, to the governor-rope fastening. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.18.5.3.

Code Data Plate

The Code Data Plate must be in plain view, securely attached to the main line disconnect or on the controller. For new installations, the Code Data Plate must display the new installation code. For alterations, the Code Data Plate must also include the alteration code and any applicable requirements of Section 8.7. Please refer to ASME A17.1-2007 / CSA B44-07, Section 8.9.

Safety Data Plates

Securely attach a metal plate, marked in a legible and permanent manner, to each safety so as to be readily visible. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.17.14.

Emergency Brake Data Plate

For machines with dual brakes, a sign stating “EMERGENCY BRAKE” must be attached to the emergency brake in a location visible from the area likely to require service. The Emergency Brake Data Plate must also contain the maximum and minimum car mass and speed. Please refer to ASME A17.1-2007 / CSA B44-07, Requirements 2.19.3.2(h) and 2.19.3.3.

Speed-Governor Data Plate

Securely attach a metal plate containing the speed-governor data to each speed governor. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.18.9.

Counterweight Runby Data Plate

In the pit, in the vicinity of the counterweight buffer, permanently and securely attach a data plate indicating the maximum designed counterweight runby. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.4.5.

Spring Buffer Data Plates

Each spring buffer must be provided with a marking plate indicating the load rating, stroke and number of springs. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.22.3.3.

Oil Buffer Data Plates

Every installed oil buffer is required to have a metal plate containing the oil buffer data permanently attached. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.22.4.11.

Machine Groove Diameter Plate

Drive sheaves and drums must be permanently and legibly marked to indicate the minimum sheave or drum diameter, measured at the bottom of the groove, that is required to maintain structural integrity. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.24.2.4.

Brake Adjustment Data Plate

The brake setting and method of measurement is required to be permanently and legibly marked on the driving machine. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.24.8.5.

Ambient Air Requirements

The temperature and humidity range that must be maintained in order to ensure safe and normal operation of the elevator must be permanently posted in the machine space and in the control room. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.7.9.2.

Warning sign for Work Areas

A sign must be prominently posted in work areas inside the hoistway, in the pit, in the car and on the car top, warning of the dangers of unexpected car movement and instructing the mechanic to engage the car locking bolt before maintaining or inspecting the brake, emergency brake or controller. Please refer to ASME A17.1-2007 / CSA B44-07, Requirements 2.7.5, [2.7.5.1.2(e)].

Warning sign for Governor inside the Hoistway

Where a governor is located inside the hoistway, a warning sign stating “Secure car against movement before servicing the governor” must be prominently posted and be visible from the governor. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.7.6.3.4.

Danger Low Clearance Sign

Any area in the pit, outside the refuge space, where vertical clearance is less than 24 inches, must be clearly marked on the pit floor with alternating diagonal red and white stripes and a sign indicating “DANGER LOW CLEARANCE” must be posted. Please refer to ASME A17.1-2007 / CSA B44-07, Requirement 2.4.1.6.

Locking Device

In conformance with ANSI Z535.2 or CAN/CSA-Z321, a sign must be posted in the work area at the top of the hoistway stating, “WARNING! Engage locking device before maintaining or inspecting brake, emergency brake, or controller. Follow manufacturers instructions for use of locking device. Elevator suspension means must be in place during use.”

Preinspection Checklist

Table 5.1 Preinspection Checklist

Controller/Machine Room Access:
• Approved walkway from the roof access door to the machine room access door if the roof slope exceeds 15 degrees from horizontal or if the roof parapet or passageway is less than 42-inches (1070 mm) wide.
• Non-combustible, weather-resistant stair to machine room (if applicable).
Controller/Machine Room Door:
• Self locking and self closing door.
• Key security code is for the machine room door only and no other door in the building.
• Machine room door swing does not impede on controller and disconnect clearances.
• Machine room door meets applicable building code requirements for fire rating.
Controller/Machine Room Enclosure:
• Minimum headroom of 84 inches (2134 mm) maintained between floor and overhead equipment or ceiling.
• Permanent machine room lighting (minimum 200 Lux at floor level).
• Complete machine room enclosure meets building code fire separation.
• Receptacles are GFCI. This also applies to receptacles in machinery spaces.
• Means are provided to maintain temperature and humidity levels to within manufacturers specifications.
• No pipes or ducts conveying gases, vapors, or liquids not used in connection with elevator equipment in the machine room enclosure
• Pipes permitted for roof drain of the machine room enclosure shall be covered for condensation or leakage, and shall exit the machine room at the closest point of entry.
• When permitted, pipes, drains, tanks or similar equipment permitted in the machine room enclosure shall not be installed directly above elevator equipment or encroach on clearance requirements.
• If a sump pump, sub floor trough, or any other electrically conductive material (metal grate, etc.) is installed in the machine room floor, it shall be covered. The cover shall be securely fastened in place and covered with an isolation mat to eliminate shock hazard.
• If a sump pump is installed in the machine room, it shall have its own dedicated single supply receptacle and is not required to be GFCI.
• Smoke sensor installed if elevator is equipped with firefighter's emergency operation, and the machine room is equipped with sprinklers.
• Clear horizontal path (minimum 18 inches or 450 mm) around all machine room equipment.
• Clear unobstructed distance (minimum of 40 inches or 1000 mm) in front of controller, disconnect(s), and electrical equipment.
• Guard rails (top and mid rails, kick plate) to eliminate trip and fall hazards in machine room.
• All machine room wiring completed.
• If machine room and or control room are remote, provide a permanent means of communication between the elevator car and remote machine room and/or control room.

Table 5.1 Preinspection Checklist

Main Disconnect Switch:
• Correctly rated fuses or circuit breakers.
• Lockable type disconnect.
• Auxiliary contact for emergency lowering positively opened mechanically (opening not solely dependent on springs).
• Properly labeled for the related elevator equipment.
• Clear unobstructed distance (minimum of 40 inches or 1000 mm) in front of disconnect.
120V AC Car Light Disconnect Switch:
• Lockable type.
• Correctly rated fuse installed (maximum 15 amp).
• Properly labeled for the related elevator equipment.
• Clear unobstructed distance (minimum of 40 inches or 1000 mm) in front of disconnect.
• Manual emergency recall operation functioning as specified.
• Automatic emergency recall operation functioning as specified.
• Emergency power or standby power functioning or able to simulate operation with elevator equipment as specified.
• Building fire control station emergency recall switch installed and functioning.
• A pit drain must be installed if the elevator is provided with firefighter's emergency operation.
Pit Enclosure
• Permanent means to prevent the accumulation of ground water in the pit.
• Pit drains designed with a positive means to prevent water, gases, and odors from entering the hoistway.
• Sumps and sump pumps installed in elevator pits are covered.
• The cover is secured and level with the pit floor.
• Sump pumps installed in pits have a dedicated single supply receptacle.
• This receptacle is not required to be of the GFCI type.
• Pit drain, if the elevator is provided with firefighter's emergency operation.
• Each pit receptacle shall be a GFCI type (except for sump pumps).
• Permanent lighting installed in the pit with illumination of not less than 100 Lux at the pit floor.
• Pit light provided with a guard.
• Pit light switch installed and easily accessible from the bottom landing door.
Pit Access Ladder
• Installed within 40 inches (1000 mm) horizontally from the unlocking means of the bottom landing door.
• Extending from the pit floor to a point 48 inches (1200 mm) above the bottom landing door sill.
• A minimum of 15.75 inches (400 mm wide). If unavoidable obstructions are present, the width maybe reduced to not less than 9 inches (225 mm). Ladder rungs, cleats, or steps spaced no greater than 11 inches (300 mm) from center, and rung clearance of no less than 4.5 inches (115 mm).
• Fixed in place and made of non-combustible material.
• No obstructions within the ladder rungs, cleats, or steps.

Table 5.1 Preinspection Checklist

Pit Access Door
• Self locking and self closing.
• Key security code for pit access door designated group 1 and shall not be part of a master key system.
• Pit access door provided with a vision panel and door switch (when applicable).
• Pit access door meets applicable building code requirements for fire rating.
• Eliminate all holes, recesses, and gaps in hoistway enclosure and ceiling.
• Bevel all projections, setbacks, or recesses greater than 4 inches (100 mm) (75° to horizontal).
• Hoistway enclosure shall be designed to meet Building Code fire rating requirements
• No pipes or ducts conveying gases, vapors, or liquids not used in connection with elevator equipment allowed in hoistway enclosure.
• No electrical wiring, raceways, and cables in the hoistway not directly in connection with the operation or function of the elevator.
• Buildings not continuously manned by authorized personnel must provide a telephone inside the elevator connected to 24 hour emergency service.
• Buildings with elevator travel greater than 59 feet (18 m) must be provided with two-way communication (telephone, intercom) readily accessible to emergency personnel within the building.
• Permanent means of communication between the elevator car and remote machine room and or control room.
• Permanent flooring inside the car.
• Adequate lighting at elevator entrances where occupancy of building is provided.
• Permanent lighting at elevator entrances provided at all occupied floors.
• No tripping hazards at the landing sills (0.25 inch [7 mm] or greater).

OEM Documentation Inclusions

These inclusions are for reference use. The most current manufacturer installation and information documents are shipped with the pertinent equipment from Motion Control Engineering. Documents are included here for the benefit of the original manufacturer. All related trademarks are the exclusive property of the equipment manufacturer.

- ELSCO Roller Guides
- Brugg RPM User Guide



MODEL D

R O L L E R G U I D E S

SMALL WONDER.

THE MODEL D ROLLER GUIDE HAS BEEN ENGINEERED TO MAXIMIZE ECONOMY WHILE OPTIMIZING RIDE QUALITY. PRIMARILY DESIGNED AS A COUNTERWEIGHT PARTNER TO THE MODEL B ROLLER GUIDE, IT CAN ALSO BE USED SUCCESSFULLY ON VERY LIGHT LOAD, LOW-SPEED ELEVATOR CABS WHERE THE RIDE QUALITY ADVANTAGES OF A SPRING-LOADED GUIDE ARE DESIRED.

FEATURES OF THE MODEL D GUIDE:

1. Neoprene Rubber Roller Wheels are specially compounded and rigorously tested to ensure a smooth, silent ride. Only genuine ELSCO neoprene wheels provide the damping characteristics essential to ride quality, and only genuine ELSCO wheels are engineered with high "memory" characteristics that prevent flat spots. ELSCO rollers are precision ground to within .002 inches (.051mm) "Total Indicator Reading" for perfect roundness and concentricity, then 100% inspected under stress to ensure a secure bond between tire and hub.

2. Precision Ball Bearings guarantee years of silent use. ELSCO specifies bearings intended for the high RPMs and demanding loads of electric motors – conditions far more rigorous than typically seen in elevator applications. This means that even after years of operation and tens of millions of cycles, only ELSCO roller wheels remain completely silent. Each bearing bore is machined to a tolerance of three ten-thousandths (.0003) of an inch (.0076mm), and two bearings are pressed into each wheel by a computer-driven press, ensuring perfect fit and alignment.

3. Fully Adjustable Stabilizing Springs allow the car to float between the rails, eliminating the bumps and vibrations that adversely affect ride quality.

ELSCO roller guides and swivel sliding guide shoes offer a cost-effective approach for improving elevator ride quality by reducing the need for expensive, labor-oriented solutions and ongoing maintenance. That's why, to elevator contractors around the world, the ELSCO name is synonymous with quality and value. At ELSCO, We are ride quality.

See inside for mounting instructions.

Many factors must be considered when making a guide selection. Please call us to discuss your specific application.

ELSCO

410-363.9020
info@elscoguides.com

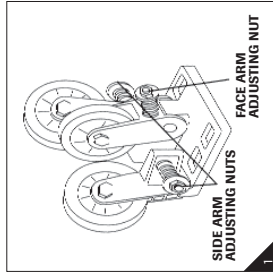


A typical installation:
Passenger Elevator Cabin guides for
Low-Speed, Mid-Rise Traction Elevator.
Speed: 350 fpm (1.75 m/s)
Capacity: 2,500 lbs. (1,100 kg).

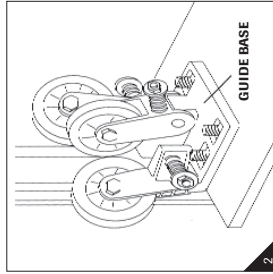


ELSCO Model D elevator roller guides are designed with adjustment features that provide superior riding characteristics. The installer can easily adjust ELSCO guides to compensate for adverse operating conditions and to minimize noise, bumps and vibration. For optimum performance and longer roller wheel life, we recommend that elevator rails be properly aligned and cleaned, and the car balanced before operation.

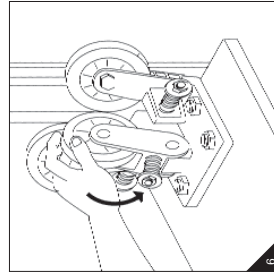
ELSCO roller guides are carefully assembled, inspected, and packed to arrive in perfect condition. When your shipment arrives, inspect it carefully for damage and, if appropriate, immediately file a claim with the carrier. For best results, read all instructions thoroughly before proceeding with the installation.



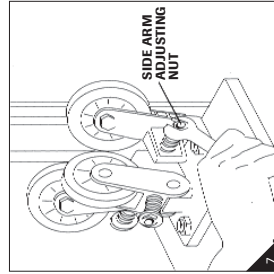
The Model D Guide comes completely assembled.



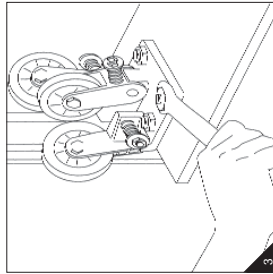
Position guide base over mounting holes or studs. Install mounting hardware (not included). Make certain that the center of the front mounting slots are located $1\frac{3}{16}$ " (30mm) back from the face of the rail (refer to mounting template).



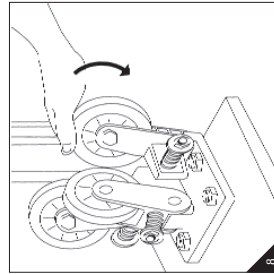
When properly adjusted, it will be possible to skid the face roller wheel by hand with moderate effort. Be certain that the face roller wheel pressures are equal for each guide.



Adjust side roller wheel pressure. Turn the side arm adjusting nuts until side arm wheels are compressed $\frac{1}{32}$ " to $\frac{1}{16}$ " (1 to 2mm), and the face arm wheels are tracking in the center of rail. This represents approximately 25 to 50 lbs. (12 to 25kg) of wheel pressure on each side arm wheel.

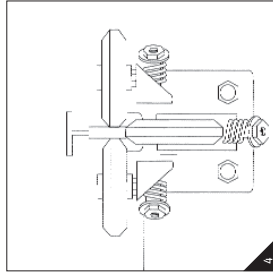


Securely tighten the mounting bolts and/or nuts. At this point, install the remaining roller guides on top and/or beneath the elevator.

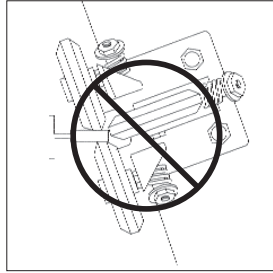


When properly adjusted, it will be possible to skid the arm roller wheels by hand with moderate effort. **Note:** If guides are equipped with polyurethane wheels, refer to step 9 for allowable wheel pressures.

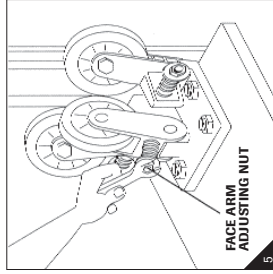
If installing guides equipped with polyurethane wheels, refer to step 9 for pertinent information.



Be sure that guides are aligned properly (as shown) before making any further adjustments.



Improper alignment.



To adjust face roller wheel pressure, tighten face arm adjusting nut until the wheel is compressed $\frac{1}{32}$ " to $\frac{1}{16}$ " (1 to 2mm). This represents 25 to 50 lbs. (12 to 25kg) of wheel pressure. **Note:** If guides are equipped with polyurethane wheels, refer to step 9 for allowable wheel pressures.

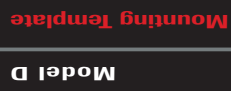


After all adjustments have been made, ride elevator in both the up and down direction at inspection speed to check hoistway clearances. Check to be sure that all mounting bolts and/or nuts are securely tightened. Make several more runs at operating speed, then recheck tracking and roller wheel pressures before returning elevator to service.



ELSCO's polyurethane roller wheels are a hard (95 Shore A durometer) polymer material intended for use on lower speed elevators when the roller wheel pressures exceed those specified for neoprene composition wheels (25 to 50 lbs. or 12 to 25kg).

While polyurethane roller wheels can operate at higher pressures, it is advisable to keep static pressure as low as possible to prevent flat spots from forming while the elevator is sitting. Flat spots can adversely affect ride quality by causing a rough and/or noisy ride. At higher pressures, it may not be possible to skid the roller wheels by hand.

[illegible]



SPECIFICATIONS

Size and Weight

Height, Overall	7-1/2"	(191mm)
Width, Overall	7-1/8"	(181mm)
Depth, Overall Maximum	6-1/4"	(159mm)
Shipping Weight	14 lbs.	(6,4kg)

Mounting Bolt Holes

Four Slots	11/16" x 1-1/16"	(17mm x 27mm)
Bolt Hole Locations	Refer to Mounting Template	

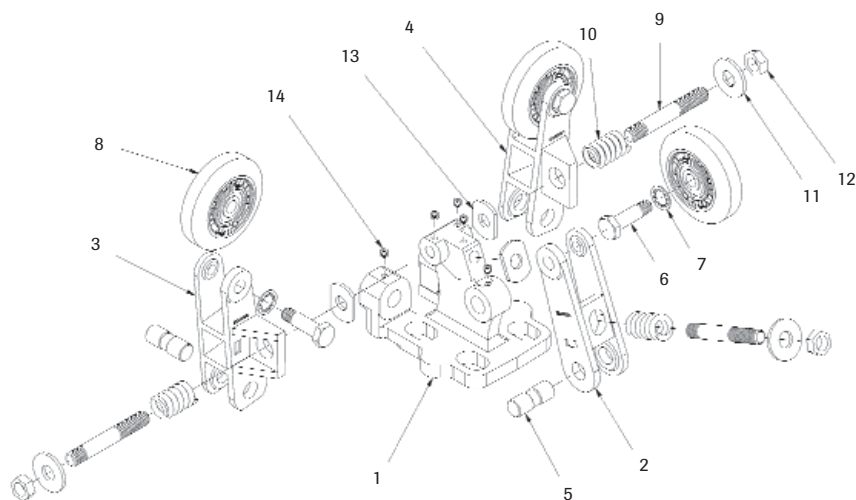
Roller Wheels

Thickness	15/16"	(24mm)
Neoprene Tread Width	1/2"	(13mm)
Polyurethane Tread Width	1/2"	(13mm)
Diameter	3-1/4"	(83mm)
Bearing I.D.	0.4724"	(12mm)
Runout (Total Indicator Reading)	0.002"	(.051mm)

Options and Factory Modifications Available

- Polyurethane composition roller wheels can be used to replace standard neoprene wheels in selected applications. Refer to the ELSCO guide selector chart or call an ELSCO guide specialist to determine proper applications. See our Frequently Asked Questions (FAQ) for more information about the trade-offs between neoprene and polyurethane wheel compositions.
- Cover plate kits are in stock and available for added safety and protection.
- Seismic retainer plates are available for select rail sizes. Call or e-mail for more information.

PARTS LIST



Model D Roller Guide

Key	Req.	Part #	Description
1	1	ED02001	Base
2	1	ED02004	Face Arm
3	1	ED02002	Left Side Arm
4	1	ED02003	Right Side Arm
5	3	ED02006	Pivot Pin
6	3	ED02005	Wheel Stud
7	3	EC18440	Wheel Stud Lock Washer
8	3	Roller Wheel - See Roller Wheel Options Below	
9	3	ED02007	Side/Face Arm Stud
10	3	EC18424	Side/Face Arm Spring
11	3	EC18421	Flat Washer
12	3	EC18422	Locknut
13	3	ED02008	Rubber Washer
14	6	EC18387	Set Screw

Standard Roller Wheel Configuration for Typical Installations:

8	3	EC18405	Standard Neoprene Roller Wheel Assembly, 3.25 in. (83mm)
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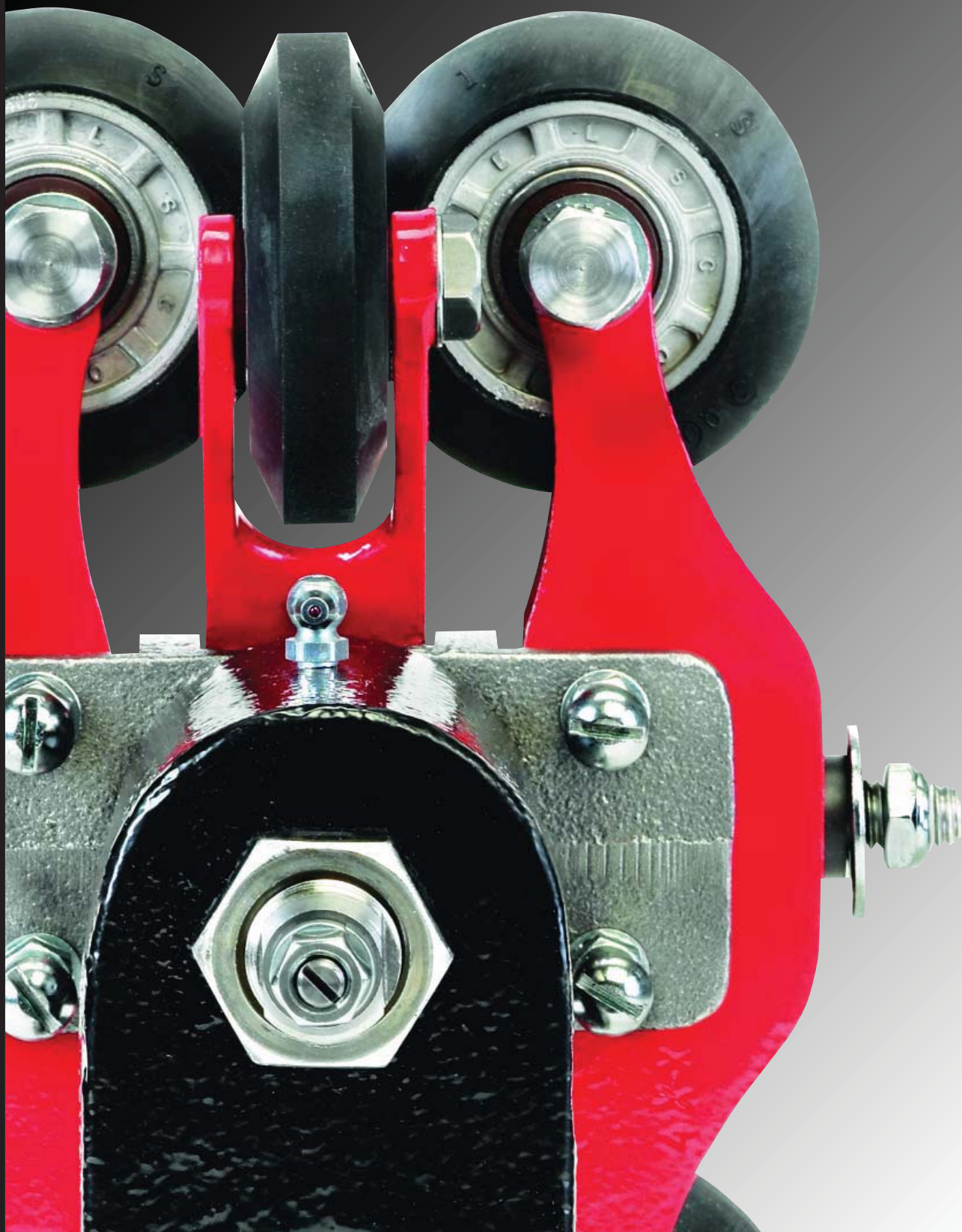
Polyurethane Roller Wheel Configuration for Heavy-Duty Installations:

8	3	EC18441	Polyurethane Roller Wheel Assembly, 3.25 in. (83mm)
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Notes:

Top Level Assembly for Model D Roller Guide with Std. Neoprene Rollers is ED02000.

Top Level Assembly for Model D Roller Guide with Polyurethane Rollers is ED02022.



MODEL C

R O L L E R G U I D E S

WELL-ROUNDED.

THE MODEL C ROLLER GUIDE IS UNIQUE IN ITS SUITABILITY TO A WIDE VARIETY OF ELEVATOR APPLICATIONS. IT IS PRIMARILY INTENDED AS THE COUNTERWEIGHT PARTNER TO THE MODEL A ROLLER GUIDE. YET IT IS ALSO APPROPRIATE FOR USE ON ELEVATOR CABS WHERE THE RIDE QUALITY ADVANTAGES OF SIX-WHEEL CONSTRUCTION ARE NEEDED, OR WHERE A SMALLER ROLLER IS REQUIRED FOR CLEARANCE, SUCH AS IN CORNER POST APPLICATIONS.

FEATURES OF THE MODEL C GUIDE:

1. Six-Wheel Construction improves ride quality and extends the application range. The tandem roller design allows the guide to "step over" misaligned rail joints with only minimal disturbance to the cab and its occupants. And by using six wheels where most other guides use just three, the Model C can withstand the higher loads associated with service and hospital cars. The added stability also helps compensate for unbalanced conditions.

2. Neoprene Rubber Roller Wheels are specially compounded and rigorously tested to ensure a smooth, silent ride. Only genuine ELSCO neoprene wheels provide the damping characteristics essential to ride quality, and only genuine ELSCO wheels are engineered with high "memory" characteristics that prevent flat spots. ELSCO rollers are precision ground to within .002 inches (.051mm) "Total Indicator Reading" for perfect roundness and concentricity, then 100% inspected under stress to ensure a secure bond between tire and hub.

3. Precision Ball Bearings guarantee years of silent use. ELSCO specifies bearings intended for the high RPMs and demanding loads of electric motors – conditions far more rigorous than typically seen in elevator applications. This means that even after years of operation and tens of millions of cycles, only ELSCO roller wheels remain completely silent. Each bearing bore is machined to a tolerance of three ten-thousandths (.0003) of an inch (.0076mm), and two bearings are pressed into each wheel by a computer-driven press, ensuring perfect fit and alignment.

4. Fully Adjustable Stabilizing Springs allow the car to float between the rails, eliminating the bumps and vibrations that adversely affect ride quality.

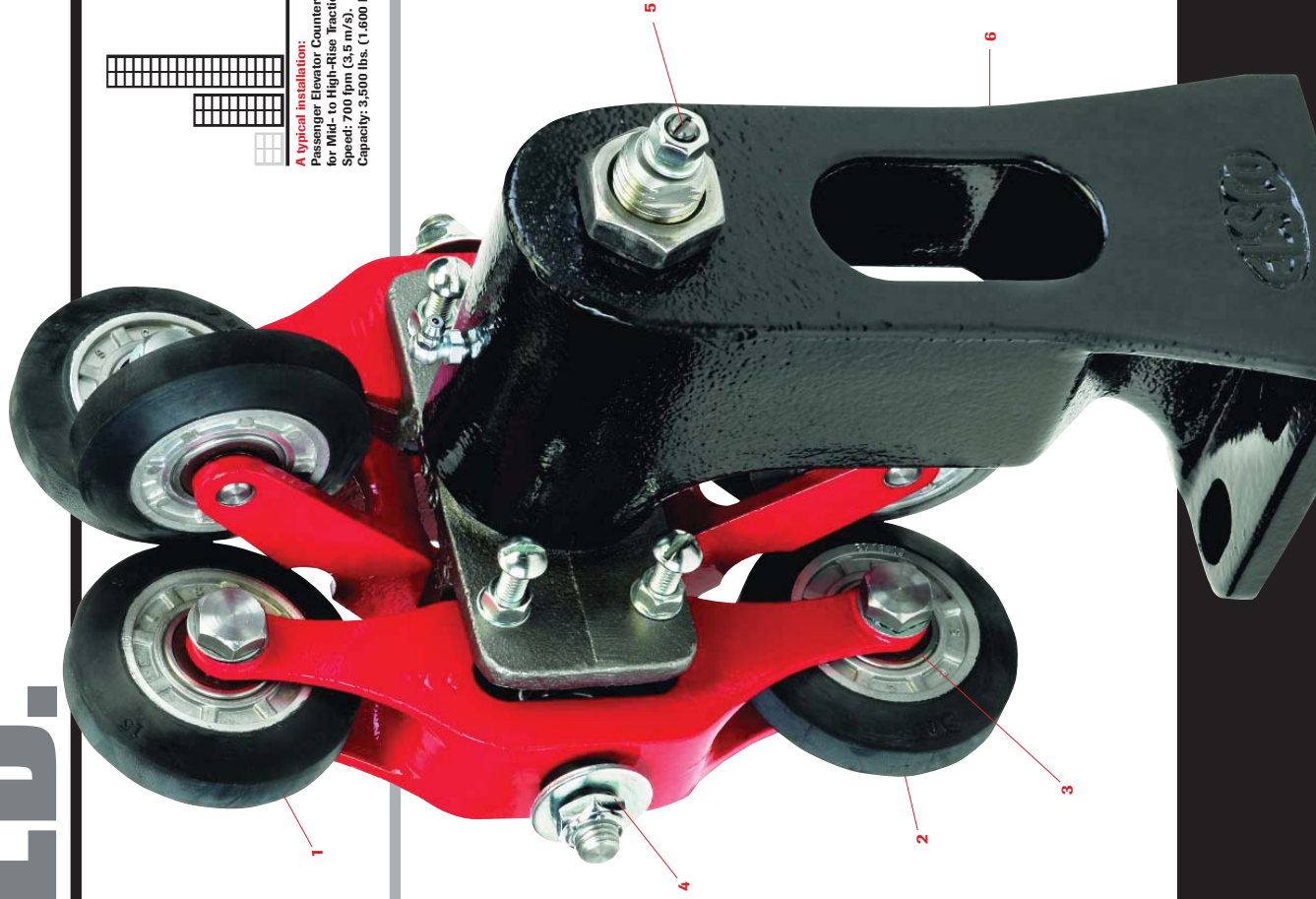
ELSCO roller guides and swivel sliding guide shoes offer a cost-effective approach for improving elevator ride quality by reducing the need for expensive, labor-oriented solutions and ongoing maintenance. That's why, to elevator contractors around the world, the ELSCO name is synonymous with quality and value. At ELSCO, We are ride quality.

Many factors must be considered when making a guide selection. Please call us to discuss your specific application.

410-363.9020
info@elscoguides.com

◀ See inside for mounting instructions.

ELSCO



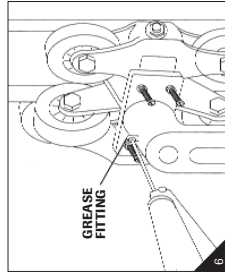
A typical installation:
Passenger Elevator Counterweight guides for Mid- to High-Rise Traction Elevator.
Speed: 700 fpm (3.5 m/s).
Capacity: 3,500 lbs. (1,600 kg).



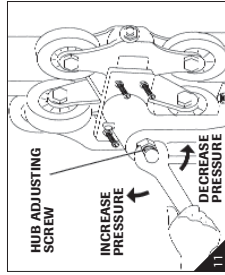
Model C Installation Instructions

ELSCO Model C elevator roller guides are designed with adjustment features that provide superior riding characteristics. The installer can easily adjust ELSCO guides to compensate for adverse operating conditions and to minimize noise, bumps and vibration. For optimum performance and longer roller wheel life, we recommend that elevator rails be properly aligned and cleaned, and the car balanced before operation.

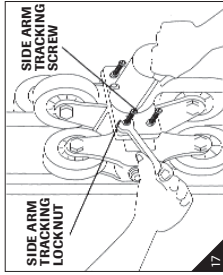
ELSCO roller guides are carefully assembled, inspected, and packed to arrive in perfect condition. When your shipment arrives, inspect it carefully for damage and, if appropriate, immediately file a claim with the carrier. For best results, read all instructions thoroughly before proceeding with the installation.



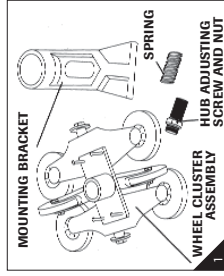
At this point, install the remaining roller guides on top and/or beneath the elevator. Lubricate the fitting on each guide with general purpose grease until a small amount appears between the hub and the bracket.



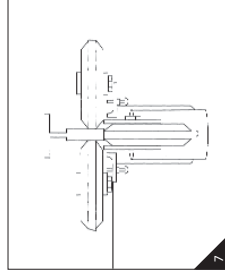
Turn the large hub adjusting screw until roller wheel pressure is compressed $1/32"$ to $1/16"$ (1 to 2mm) on the rail. This represents approximately 25 to 50 lbs. (12 to 25kg) of wheel pressure. **Note:** If installing guides equipped with polyurethane roller wheels, refer to step 21 for allowable wheel pressures.



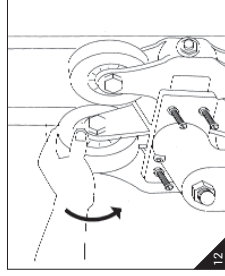
If it is necessary to adjust side arm tracking, loosen locknuts and turn side arm tracking screws until top and bottom roller wheels are parallel to the face of the rail. Now tighten locknuts. **Note:** If adjusted correctly, tracking screws should not restrict float or walking beam action of side arm assembly.



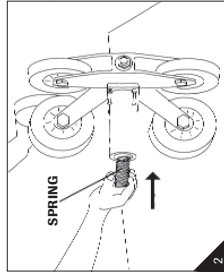
The Model C Guide includes a mounting bracket, wheel cluster assembly, and bag containing a spring and hub adjusting screw with locknut. **Note:** If adjustable stops have been ordered, you will also receive a solid stop washer, an adjustable stop shaft, lock washer and locknut.



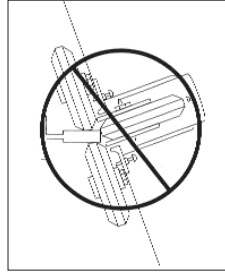
Be sure guides are aligned properly (as shown) before making any further adjustments.



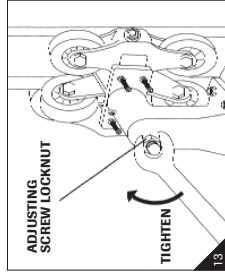
When properly adjusted, it will be possible to skid the face roller wheel by hand with moderate effort.



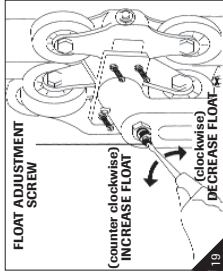
After verifying the proper location of the mounting holes (refer to mounting template), begin installation by inserting the spring into the hub. **Note:** If installing adjustable stops, insert the solid stop washer into the hub before inserting the spring.



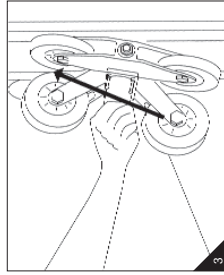
Improper alignment



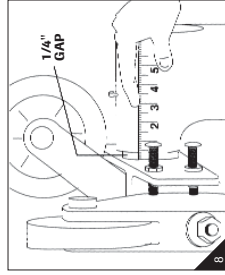
Be certain that both the face wheel pressure and the recommended gap measurement (refer to step 8) are equal for each guide. **Caution: This gap measurement may now be greater than $1/16"$ (5mm), but should never exceed $3/16"$ (10mm).** Now tighten adjusting screw locknut.



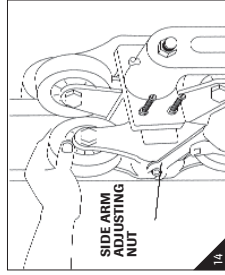
To set postwise float, turn adjustment screw clockwise until it makes contact with solid stop washer (installed in step 2 "Note 2"). At this point, there will be zero postwise float. To increase float, turn adjustment screw counter-clockwise. **Note:** Each full turn equals $1/16"$ (2mm).



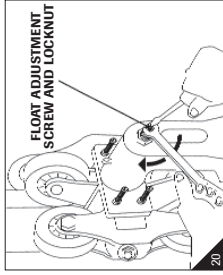
Position uppermost roller wheels of wheel cluster assembly onto the rail, and while maintaining pressure against the rail, roll entire assembly upward until face roller wheels are firmly seated on the rail.



Set $1/4"$ (6mm) gap between wheel cluster assembly and bracket. **Note:** Be certain that both face roller wheels are firmly seated against the rail while making this adjustment.

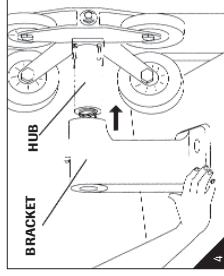


Adjust side arm roller pressure. Turn side arm adjusting nuts until side wheels are compressed $1/32"$ to $1/16"$ (1 to 2mm) and the face wheels are tracking in the center of the rail. **Note:** If guides are equipped with polyurethane roller wheels, refer to step 21 for allowable pressures.

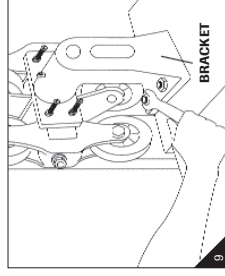


When the desired amount of postwise float is set, tighten the locknut securely while holding float adjustment screw in place.

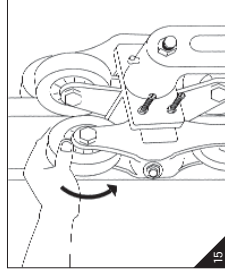
If installing guides equipped with polyurethane wheels, refer to step 21 for pertinent information.



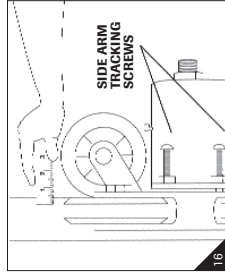
Place bracket onto the hub of wheel cluster assembly.



Securely tighten mounting bolts. Repeat steps 7 and 8 on remaining guides before proceeding. This helps assure that the elevator car will be properly centered between the rails.



At this point, there will be 25 to 50 lbs. (12 to 25kg) of pressure on each side roller wheel, and the wheels can be skidded by hand on the rail with moderate effort.



Each pair of side arm roller wheels should track parallel to the face of the rail. The distance from the edge of each roller wheel to the face edge of the rail should be the same at both the top and bottom roller wheels of each pair. **Note:** The side arm tracking screws are pre-set at the factory and should need no further adjustment.

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ELSCO's polyurethane roller wheels are a hard (95 Shore A durometer) polymer material intended for use on lower speed elevators when the roller wheel pressures exceed those specified for neoprene composition wheels (25 to 50 lbs. or 12 to 25kg).

While polyurethane roller wheels are capable of operating at higher pressures, it is advisable to keep static pressure as low as possible to prevent flat spots from forming while the elevator is sitting. Flat spots can adversely affect ride quality by causing rough and/or noisy ride. At higher pressures, it may not be possible to skid the wheels by hand.

22

After all adjustments have been made, ride elevator in both the up and down direction at inspection speed to check hoistway clearances. Check to be sure that all mounting bolts and/or nuts, and adjustment locknuts are securely tightened. Make several more runs at operating speed, then recheck float (if applicable), tracking and roller wheel pressures before returning elevator to service.



Technical drawing of a T-161 rail, showing dimensions in inches and millimeters. The drawing includes a side view and a top view. Key dimensions are:

- Overall width: 8 5/8 in (219mm)
- Overall height: 8 1/2 in (216mm)
- Distance from face of rail to center of bolt: 7 3/8 in (187mm)
- Distance from face of rail to center of nut: 1 1/16 in (27mm)
- Distance from face of rail to center of nut: 1 3/16 in (30mm)
- Distance from face of rail to center of nut: 2 3/8 in (60.3mm)
- Distance from face of rail to center of nut: 2 3/8 in (60mm)
- Distance from face of rail to center of nut: 1 3/8 in (35mm)
- Maximum overall depth: 8 1/2 in (216mm)
- Maximum overall width on T-161 (8#) rail: 8 5/8 in (219mm)

SHOWN ACTUAL SIZE



SPECIFICATIONS

Size and Weight

Height, Overall	13-5/8"	(346mm)
Width, Overall	8-5/8"	(219mm)
(Modified on Request)	7-1/8"	(181mm)
Depth, Overall Maximum	8-1/2"	(216mm)
Shipping Weight	28 lbs.	(12,7 kg)

Mounting Bolt Holes

Four Slots	11/16" x 1-1/16"	(17mm x 27mm)
Bolt Hole Locations	Refer to Mounting Template	

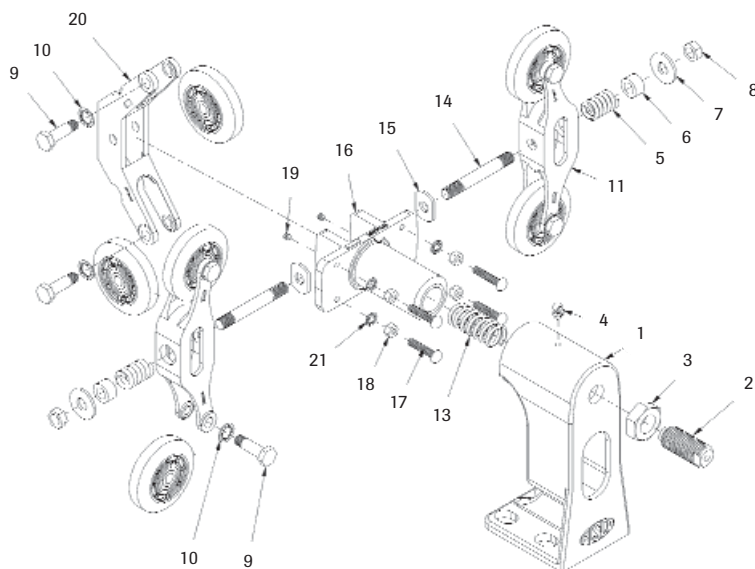
Roller Wheels

Thickness	15/16"	(24mm)
Neoprene Tread Width	1/2"	(13mm)
Polyurethane Tread Width	1/2"	(13mm)
Diameter	3-1/4"	(83mm)
Bearing I.D.	0.4724"	(12mm)
Runout (Total Indicator Reading)	0.002"	(.051mm)

Options and Factory Modifications Available

- Polyurethane composition roller wheels can be used to replace standard neoprene wheels in selected applications. Refer to the ELSCO guide selector chart or call an ELSCO guide specialist to determine proper applications. See our Frequently Asked Questions (FAQ) for more information about the trade-offs between neoprene and polyurethane wheel compositions.
- Special "close clearance" modification is available to limit overall guide width to 7-1/8" (181mm) on 5/8" (16mm) rail widths where required for tight hoistway clearances, as in corner-post applications.
- Cover plate kits are in stock and available for added safety and protection.
- Seismic retainer plates are available for select rail sizes. Call or e-mail for more information.

PARTS LIST



Notes:

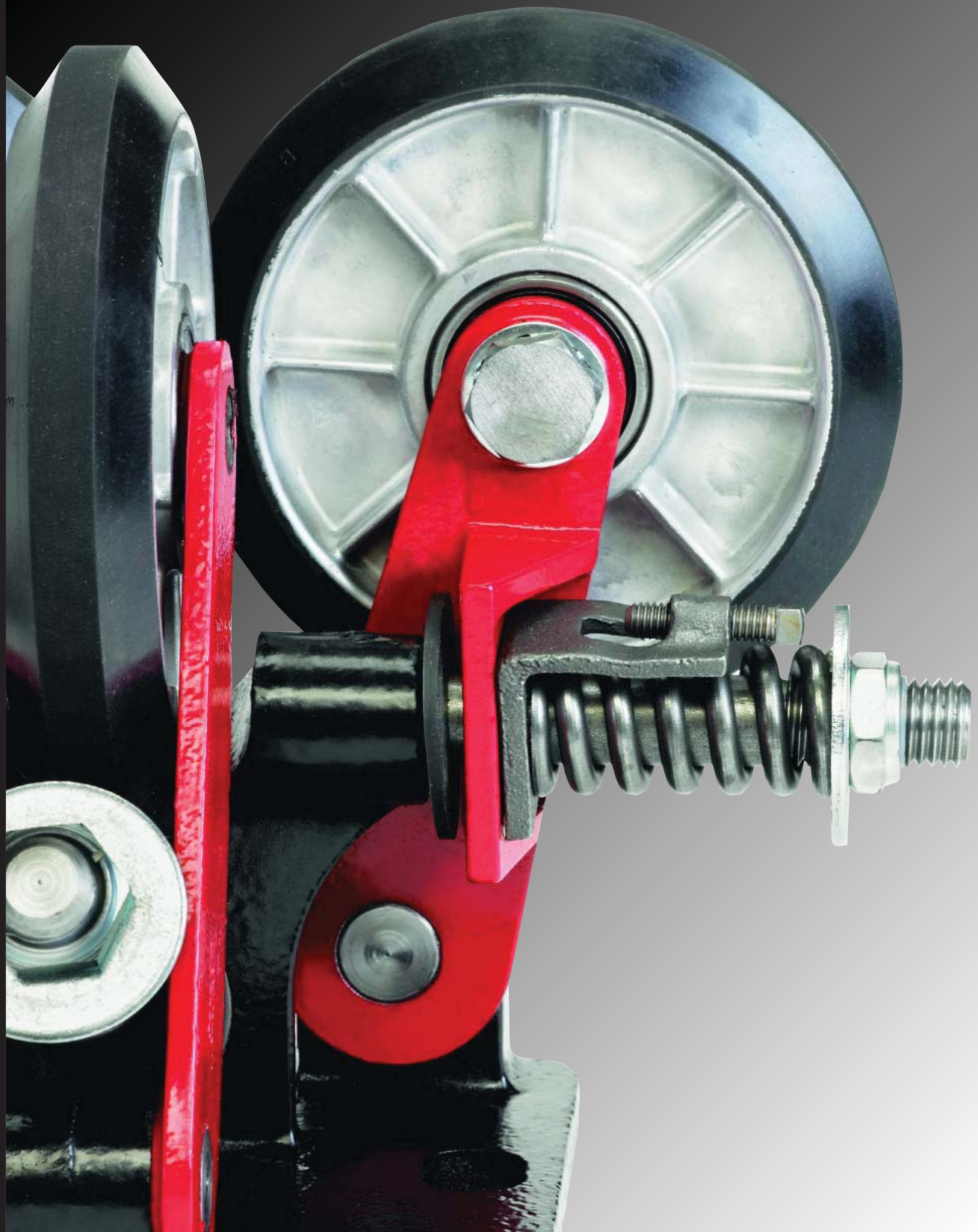
- Top Level Assembly for Model C Roller Guide with Std. Neoprene Rollers is EC18400.
Top Level Assembly for Model C Roller Guide with Polyurethane Rollers is EC18445.
Adjustable Stop Kits are available as an option under part no. EC18412.
■ Parts cannot be ordered individually, and must be ordered as a complete subassembly.

Model C Roller Guide

Key	Req.	Part #	Description
1	1	EC18401	Bracket
2	1	EC18414	Hub Adjustment Screw
3	1	EC19762	Hub Adjustment Locking Nut
4	1	EA18362	Grease Fitting
5	2	EC18424	Side Arm Spring
6	2	EC18416	Fiber Sleeve
7	2	EC18421	Flat Washer
8	2	EC18422	Locknut
9	6	EC18417	Wheel Stud
10	6	EC18440	Wheel Stud Lock Washer
11	2	EC18411	Side Arm
12	6	Roller Wheel - See Roller Wheel Options Below	
13	1	EC18425	Hub Spring
14	2	■ EC18418	Side Arm Stud
15	2	ED02008	Rubber Washer
16	1	■ EC19751	Hub
17	4	EA19747	Side Arm Tracking Screw
18	4	EC18428	Hex Nut
19	2	EC18387	Set Screw
20	1	■ EC18409	Face Arm
21	4	EF04131	Lock Washer

Standard Roller Wheel Configuration for Typical Installations:

12	6	EC18405	Standard Neoprene Roller Wheel Assembly, 3.25 in. (83mm)
Polyurethane Roller Wheel Configuration for Heavy-Duty Installations:			
12	6	EC18441	Polyurethane Roller Wheel Assembly, 3.25 in. (83mm)



MODEL B

M O D E R A T E S P E E D R O L L E R G U I D E S

THE INDUSTRY STANDARD.

THE MODEL B ROLLER GUIDE OFFERS EXCEPTIONAL PERFORMANCE IN A COMPACT, EASY-TO-INSTALL PACKAGE. A BROAD APPLICATION RANGE, EASE OF USE, AND OUTSTANDING VALUE HAVE MADE THE MODEL B OUR MOST POPULAR ROLLER GUIDE.

FEATURES OF THE MODEL B GUIDE:

1. Neoprene Rubber Roller Wheels are specially compounded and rigorously tested to ensure a smooth, silent ride. Only genuine ELSCO neoprene wheels provide the damping characteristics essential to ride quality, and only genuine ELSCO wheels are engineered with high "memory" characteristics that prevent flat spots. ELSCO rollers are precision ground to within .002 inches (.051mm) "Total Indicator Reading" for perfect roundness and concentricity, then 100% inspected under stress to ensure a secure bond between tire and hub.

2. Precision Ball Bearings guarantee years of silent use. ELSCO specifies bearings intended for the high RPMs and demanding loads of electric motors – seen in elevator applications. This means that even after years of operation and tens of millions of cycles, only ELSCO roller wheels remain completely silent. Each bearing bore is machined to a tolerance of five ten-thousandths (.0005) of an inch (.0127mm), and two bearings are pressed into each wheel by a computer-driven press, ensuring perfect fit and alignment.

3. Fully Adjustable Stabilizing

Springs allow the car to float between the rails, eliminating the bumps and vibrations that adversely affect ride quality.

4. Adjustable Stops enable precise control of the car's overall float between the rails, in both postwise and front-to-back axes. Adjustable stops are a standard feature on the Model B guide.

5. Durable Structural Components. ELSCO castings are made from high-tensile-strength ductile iron and aluminum for an optimal combination of strength, durability, and light weight. High quality guide hardware ensures long life and ease of adjustment in the field. All components are inspected and assembled to exacting standards for a lifetime of reliable performance.

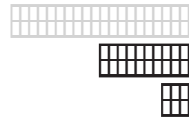
ELSCO roller guides and swivel sliding guide shoes offer a cost-effective approach for improving elevator ride quality by reducing the need for expensive, labor-oriented solutions and ongoing maintenance. That's why, for over 60 years, contractors around the world, the ELSCO name is synonymous with quality and value. At ELSCO, we are ride quality.

See inside for mounting instructions.

Many factors must be considered when making a guide selection. Please call us to discuss your specific application.

ELSCO

4 10-363.9020
info@elscoguides.com



A typical installation:
Passenger Elevator Cabin guides for Low-Mid-Rise Trifurcator Elevator.
Speed: 350 fpm (1.75 m/s)
Capacity: 2,500 lbs. (1,100 kg).

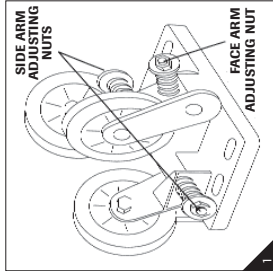




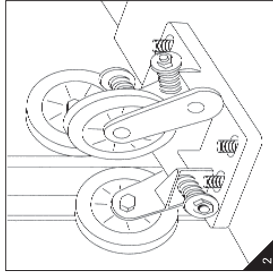
Model B Installation Instructions

ELSCO roller guides are carefully assembled, inspected, and packed to arrive in perfect condition. When your shipment arrives, inspect it carefully for damage and, if appropriate, immediately file a claim with the carrier. For best results, read all instructions thoroughly before proceeding with the installation.

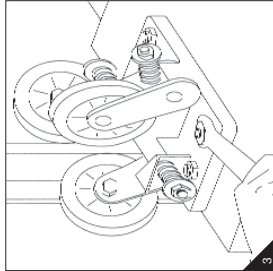
ELSCO Model B elevator roller guides are designed with adjustment features that provide superior riding characteristics. The installer can easily adjust ELSCO guides to compensate for adverse operating conditions and to minimize noise, bumps and vibration. For optimum performance and longer roller wheel life, we recommend that elevator rails be properly aligned and cleaned, and the car balanced before operation.



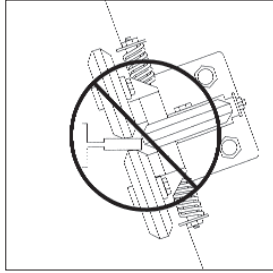
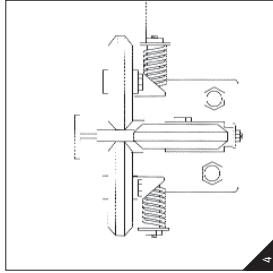
The Model B Guide comes completely assembled. **Note:** If adjustable stops have been ordered, they will be installed on the guide.



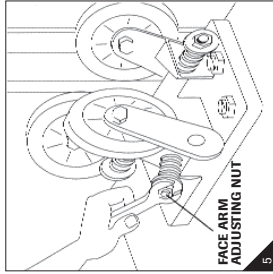
Securely tighten the mounting bolts and/or nuts. At this point, install the remaining roller guides on top and/or beneath the elevator.



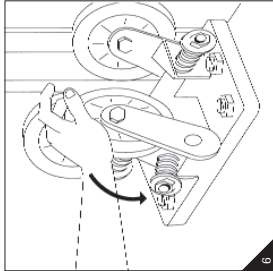
Be sure that guides are aligned properly (as shown) before making any further adjustments.



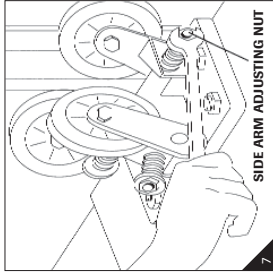
Improper alignment.



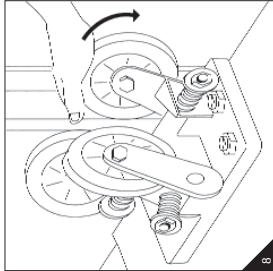
To adjust face roller wheel pressure, tighten face arm adjusting nut until the wheel is compressed $1/32"$ to $1/16"$ (1 to 2mm). This represents 25 to 50 lbs. (12 to 25kg) of wheel pressure. **Note:** If guides are equipped with polyurethane wheels, refer to step 11 for allowable wheel pressures.



When properly adjusted, it will be possible to skid the face roller wheel by hand with moderate effort. Be certain that the face roller wheel pressures are equal for each guide.

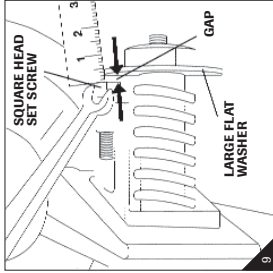


Adjust side roller wheel pressure. Turn the side arm adjusting nuts until side arm wheels are compressed $1/32"$ to $1/16"$ (1 to 2mm), and the face arm wheels are tracking in the center of rail. This represents approximately 25 to 50 lbs. (12 to 25kg) of wheel pressure on each side arm wheel.



When properly adjusted, it will be possible to skid the side arm roller wheels by hand with moderate effort. **Note:** If guides are equipped with polyurethane wheels, refer to step 11 for allowable wheel pressures.

If guides are equipped with adjustable stops, refer to steps 9 and 10. Caution: Adjustable stops may shift during shipment. Be certain to position adjustable stops correctly (as shown in step 9 diagram).



To adjust float, turn the square head set screw to increase or decrease the gap between the large flat washer and the head of the square head set screw. **Note:** The amount of float will be approximately twice the gap measured (e.g. $1/16"$ gap = $1/8"$ float, and 2mm gap = 4mm float).



ELSCO's polyurethane roller wheels are a hard (95 Shore A durometer) polymer material intended for use on lower speed elevators where the roller wheel pressures exceed those specified for neoprene composition wheels (25 to 50 lbs., or 12 to 25kg).

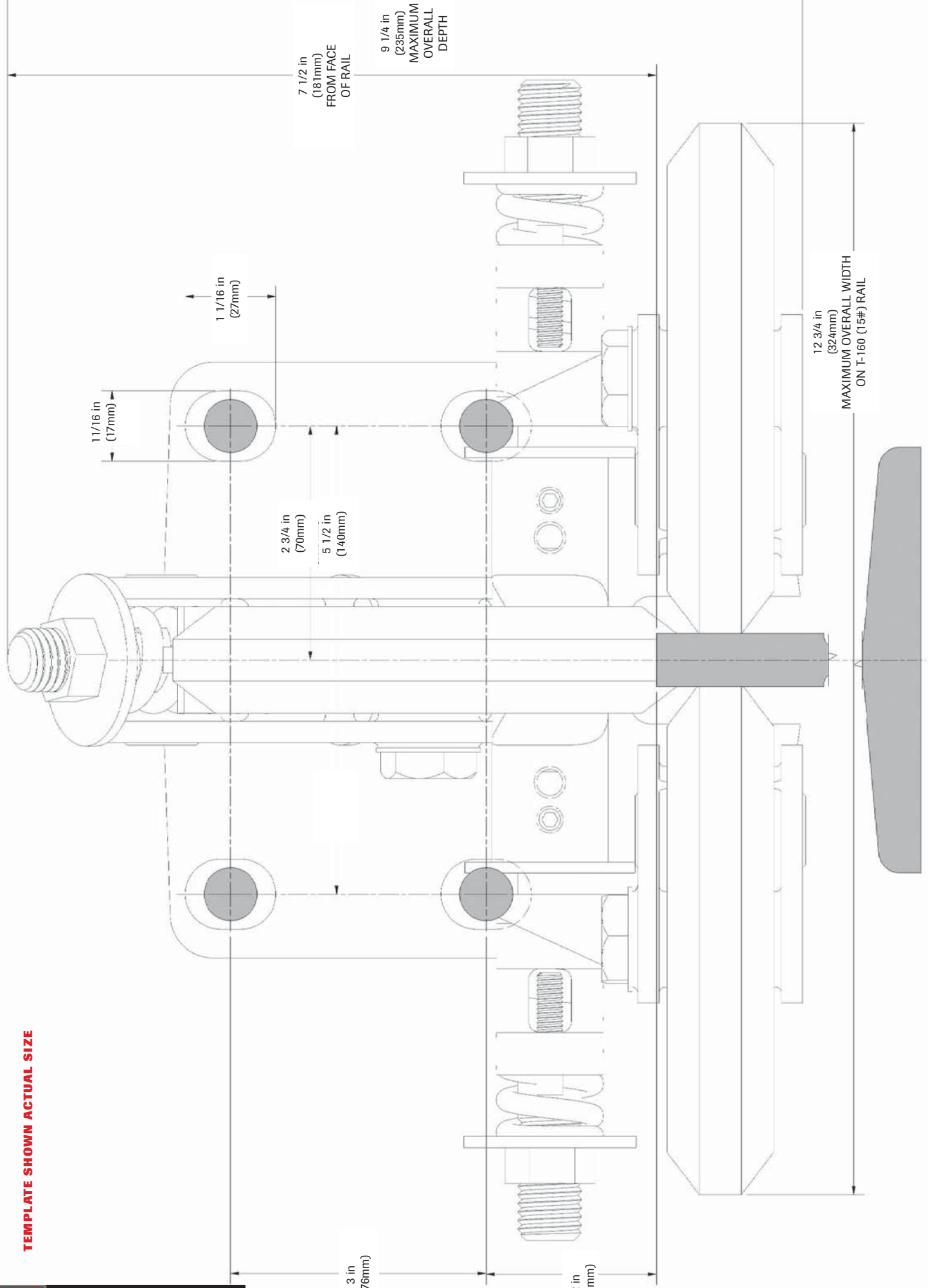
While polyurethane roller wheels can operate at pressures up to 300 lbs. (136kg), pressure as low as possible to prevent flats from forming while the elevator is stopping. Flat spots can adversely affect ride quality by causing a rough and/or noisy ride. At higher pressures, it may not be possible to skid the roller wheels by hand.



After all adjustments have been made, ride elevator in both the up and down direction at inspection speed to check hoistway clearances. Check to be sure that all mounting bolts and/or nuts are securely tightened. Make several more runs at operating speed, then retract float (if applicable), tracking and roller wheel pressures before returning elevator to service.



TEMPLATE SHOWN ACTUAL SIZE





SPECIFICATIONS

Size and Weight

Height, Overall	9-3/4"	(248mm)
Width, Overall	12-3/4"	(324mm)
Depth, Overall Maximum	9-1/4"	(235mm)
Shipping Weight	31 lbs.	(14,1kg)

Mounting Bolt Holes

Four Slots	11/16" x 1-1/16"	(17mm x 27mm)
Bolt Hole Locations	Refer to Mounting Template	

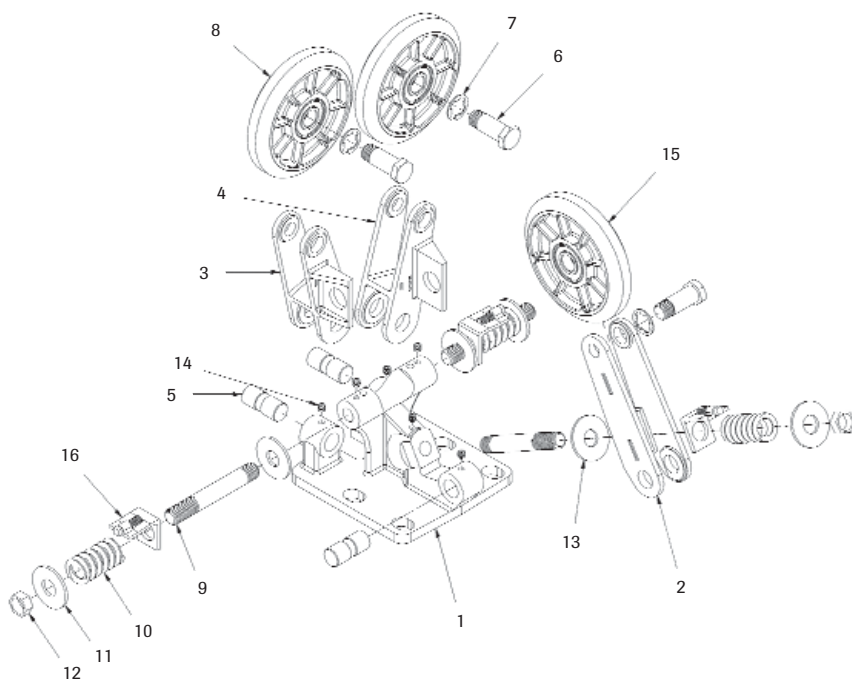
Roller Wheels

Thickness	1-1/4"	(32mm)
Neoprene Tread Width (face & side arm roller wheel)	1/2"	(13mm)
Polyurethane Tread Width (face roller wheel)	1/2"	(13mm)
Polyurethane Tread Width (side arm roller wheel)	7/8"	(22mm)
Diameter	6"	(152mm)
Bearing I.D.	0.7874"	(20mm)
Runout (Total Indicator Reading)	0.002"	(.051mm)

Options and Factory Modifications Available

- Polyurethane composition roller wheels can be used to replace standard neoprene wheels in selected applications. Refer to the ELSCO guide selector chart or call an ELSCO guide specialist to determine proper applications. See our Frequently Asked Questions (FAQ) for more information about the trade-offs between neoprene and polyurethane wheel compositions.
- Cover plate kits are in stock and available for added safety and protection.
- Seismic retainer plates are available for select rail sizes. Call or e-mail for more information.

PARTS LIST



Model B Roller Guide

Key	Req.	Part #	Description
1	1	EB02101	Base
2	1	EB02104	Face Arm
3	1	EB02102	Left Side Arm
4	1	EB02103	Right Side Arm
5	3	EB02106	Pivot Pin
6	3	EB02105	Wheel Stud
7	3	EA18388	Wheel Stud Lock Washer
8	2	Rail Side Roller - See Roller Wheel Options Below	
9	3	EB02107	Side/Face Arm Stud
10	3	EA18379	Side/Face Arm Spring
11	3	EA18373	Flat Washer
12	3	EA18376	Locknut
13	3	EA18378	Rubber Washer
14	6	EA19765	Set Screw
15	1	Rail Face Roller - See Roller Wheel Options Below	
16	3	EB02119	Adjustable Stop

Standard Roller Wheel Configuration for Typical Installations:

12	4	■ EA18359	Standard Neoprene Roller Wheel Assembly, 6 in. (152mm)
21	2	■ EA18359	Standard Neoprene Roller Wheel Assembly, 6 in. (152mm)

Polyurethane Roller Wheel Configuration for Heavy-Duty Installations:

12	4	■ EA18347	Polyurethane Roller Wheel Assembly, 6 in. (152mm) - Rail Side
21	2	■ EA18348	Polyurethane Roller Wheel Assembly, 6 in. (152mm) - Rail Face

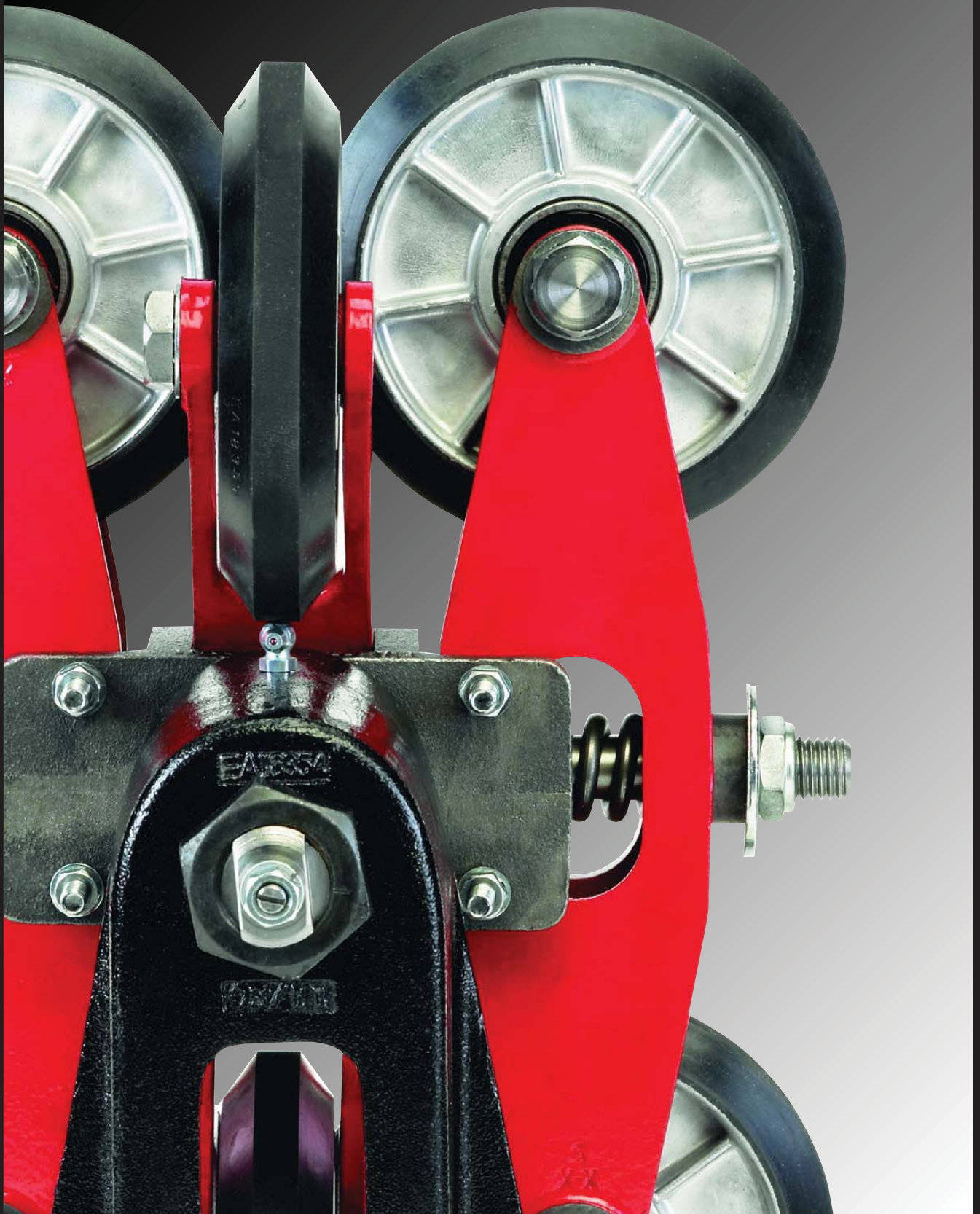
Notes:

Top Level Assembly for Model B Roller Guide with Std. Neoprene Rollers is EB02100.

Top Level Assembly for Model B Roller Guide with Polyurethane Rollers is EB02114.

■ Neoprene rollers are identical for rail side and face.

■ Polyurethane rollers use different tread widths for rail side and rail face.



MODEL A

H I G H S P E E D R O L L E R G U I D E S

THE FLAGSHIP

THE MODEL A ROLLER GUIDE HAS BEEN THE ELEVATOR INDUSTRY'S GOLD STANDARD FOR ELEVATOR RIDE QUALITY FOR OVER 45 YEARS. ITS OUTSTANDING PERFORMANCE, RUGGED DURABILITY, AND EXTENDED APPLICATION RANGE MAKE IT OUR FLAGSHIP PRODUCT.

FEATURES OF THE MODEL A GUIDE:

- 1. Six-Wheel Construction** improves ride quality and extends the application range. The tandem roller design allows the guide to "step over" misaligned rail joints with only minimal disturbance to the cab and its occupants. And by using six wheels where most other guides use just three, the Model A can withstand the higher loads associated with service and hospital cars. The added stability also helps compensate for unbalanced conditions.
- 2. Neoprene Rubber Roller Wheels** are specially compounded and rigorously tested to ensure a smooth, silent ride. Only genuine ELSCO neoprene wheels provide the damping characteristics essential to ride quality, and only genuine ELSCO wheels are engineered with high "memory" characteristics that prevent flat spots. ELSCO rollers are precision ground to within .002 inches (.051mm) "Total Indicator Reading" for perfect roundness and concentricity, then 100% inspected under stress to ensure a secure bond between tire and hub.
- 3. Precision Ball Bearings** guarantee years of silent use. ELSCO specifies bearings intended for the high RPMs and demanding loads of electric motors – the conditions far more rigorous than typically seen in elevator applications. This means that even after years of operation and tens of millions of cycles, only ELSCO roller wheels remain completely silent. Each bearing bore is machined to a tolerance of five ten-thousandths (.0005) of an inch (.127mm), and two bearings are pressed into each wheel by a computer-driven press, ensuring perfect fit and alignment.
- 4. Fully Adjustable Stabilizing Springs** allow the car to float between the rails, eliminating the bumps and vibrations that adversely affect ride quality.
- 5. Adjustable Stops** enable precise control of the car's overall postwise float between the rails. Adjustable stops are a standard feature on the Model A guide.
- 6. Durable Structural Components.** ELSCO castings are made from high-tensile-strength ductile iron and aluminum for an optimal combination of strength, durability, and light weight. High quality guide hardware ensures long life and ease of adjustment in the field. All components are inspected and assembled to exacting standards for a lifetime of reliable performance.

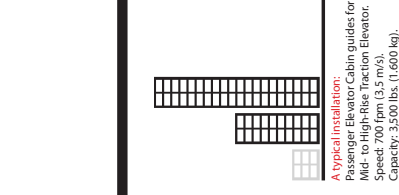
ELSCO roller guides and roller idling guide shoes offer an effective and safe approach for improving elevator ride quality by reducing the need for expensive, labor-oriented solutions and ongoing maintenance. That's why, to elevator contractors around the world, the ELSCO name is synonymous with quality and value. At ELSCO, we are ride quality.

◀ See inside for mounting instructions.

Many factors must be considered when making a guide selection. Please call us to discuss your specific application.

ELSCO

410.363.9020
info@elscoguides.com

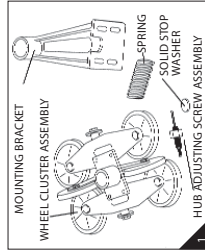


M I G

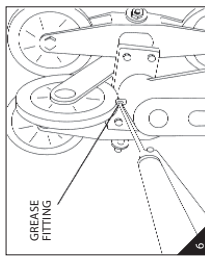
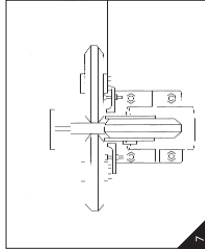


ELSCO Model A elevator roller guides are designed with adjustment features that provide superior riding characteristics. The installer can easily adjust ELSCO guides to compensate for adverse operating conditions and to minimize noise, bumps and vibration. For optimum performance and longer roller wheel life, we recommend that roller guides be properly aligned and cleaned, and the car balanced before operation.

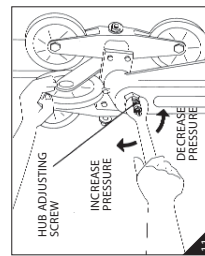
ELSCO roller guides are carefully assembled, inspected, and packed to arrive in perfect condition. When you shipment arrives, inspect it carefully for damage and, if appropriate, immediately file a claim with the carrier. For best results, read all instructions thoroughly before proceeding with the installation.



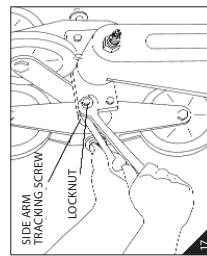
The Model A Guide includes a mounting bracket, a wheel cluster assembly and a bag containing a spring, a solid stop washer, and a hub adjusting screw assembly consisting of a stop shaft, lock washer and locknut.



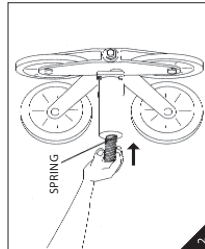
At this point, install the remaining roller guides on top and/or beneath the elevator. Lubricate the fitting on each guide with general purpose grease until a small amount appears between the hub and the bracket.



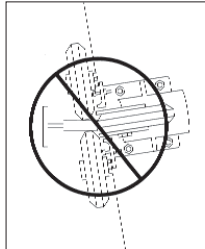
Turn the large hub adjusting screw until roller wheel is compressed $\frac{1}{32}$ to $\frac{1}{16}$ " (1 to 2 mm) on the rail. This represents approximately 25 to 50 lbs. (12 to 25 kg) of wheel pressure. Note: If installing guides equipped with polyurethane roller wheels, refer to step 21 for allowable wheel pressures.



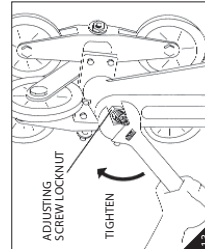
If it is necessary to adjust side arm tracking, loosen locknuts and turn side arm tracking screws parallel to the face of the rail. Now tighten locknuts. Note: If adjusted correctly, tracking screws should not restrict float or walking beam action of side arm assembly.



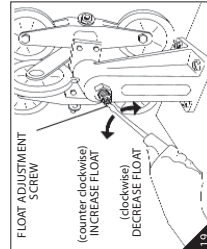
After verifying the proper location of the mounting holes (refer to mounting template), begin installation by inserting the solid stop washer into the hub. Now, insert the spring into the hub.



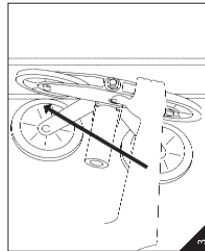
Improper alignment



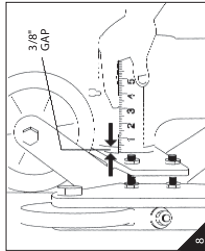
Be certain that both face roller wheel pressure and recommended gap measurement (see step 8) are equal for each guide. Caution: This gap measurement may now be greater than $\frac{3}{8}$ " (10 mm), but should never exceed $\frac{1}{2}$ " (12 mm). Now, tighten adjusting screw locknut.



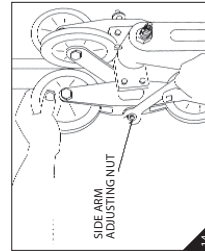
To set postwise float, turn adjustment screw clockwise until it makes contact with solid stop washer. This position will be zero postwise float. To increase float, turn adjustment screw counterclockwise. Note: Each full turn equals $\frac{1}{16}$ " (2 mm). For best results, set the float at $\frac{1}{16}$ " to $\frac{5}{16}$ " (6 mm to 10 mm).



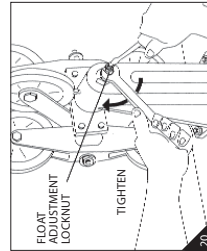
Position the uppermost roller wheels of wheel cluster assembly onto the rail, and while maintaining pressure against the rail, roll entire assembly upward until face roller wheels are firmly seated on the rail.



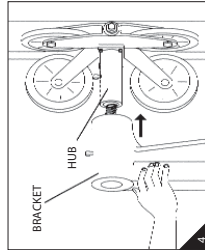
Set $\frac{3}{16}$ " (10 mm) gap between wheel cluster assembly and bracket. Note: Be certain that both face roller wheels are firmly seated against the rail while making this adjustment.



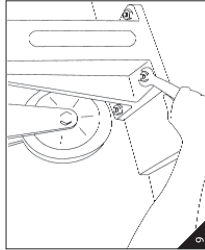
Adjust side arm roller wheel pressure. Turn side arm adjusting nuts until side roller wheels are compressed $\frac{1}{32}$ to $\frac{1}{16}$ " (1 to 2 mm), and face wheels are tracking in the center of the rail. Note: If installation guides equipped with polyurethane wheels, refer to step 21 for allowable wheel pressures.



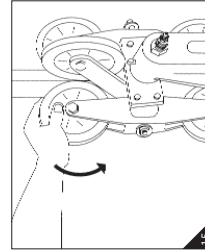
When the desired amount of postwise float is set, tighten locknut securely while holding float adjustment screw in place. If installing guides equipped with polyurethane roller wheels, refer to step 21 for pertinent information.



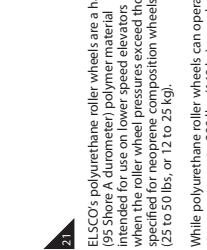
Place bracket onto the hub of wheel cluster assembly.



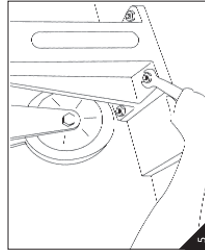
Securely tighten mounting bolts. Repeat steps 7 and 8 on remaining guides before proceeding. This helps assure that the elevator car will be properly centered between the rails.



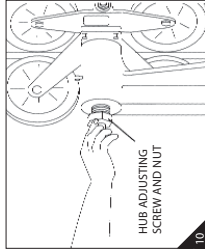
At this point, there will be 25 to 50 lbs. (12 to 25 kg) of pressure on each side roller wheel and the wheels can be skidded by hand on the rail with moderate effort.



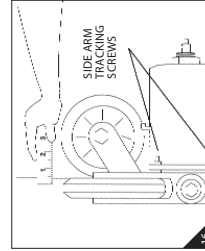
Each pair of side arm roller wheels should track parallel to the face of the rail. The distance from the edge of each roller wheel to the face edge of the rail should be the same at both the top and bottom wheels of each palloff. The side arm tracking screws are pre-set at the factory and should need no further adjustment.



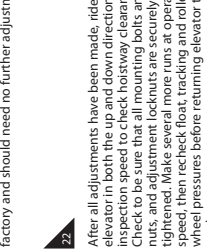
Position bracket over mounting holds or studs. Install mounting hardware (not included with guide) as required. Tighten lightly to hold bracket in place prior to final adjustment.



Securely tighten mounting bolts. Repeat steps 7 and 8 on remaining guides before proceeding. This helps assure that the elevator car will be properly centered between the rails.



Each pair of side arm roller wheels should track parallel to the face of the rail. The distance from the edge of each roller wheel to the face edge of the rail should be the same at both the top and bottom wheels of each palloff. The side arm tracking screws are pre-set at the factory and should need no further adjustment.

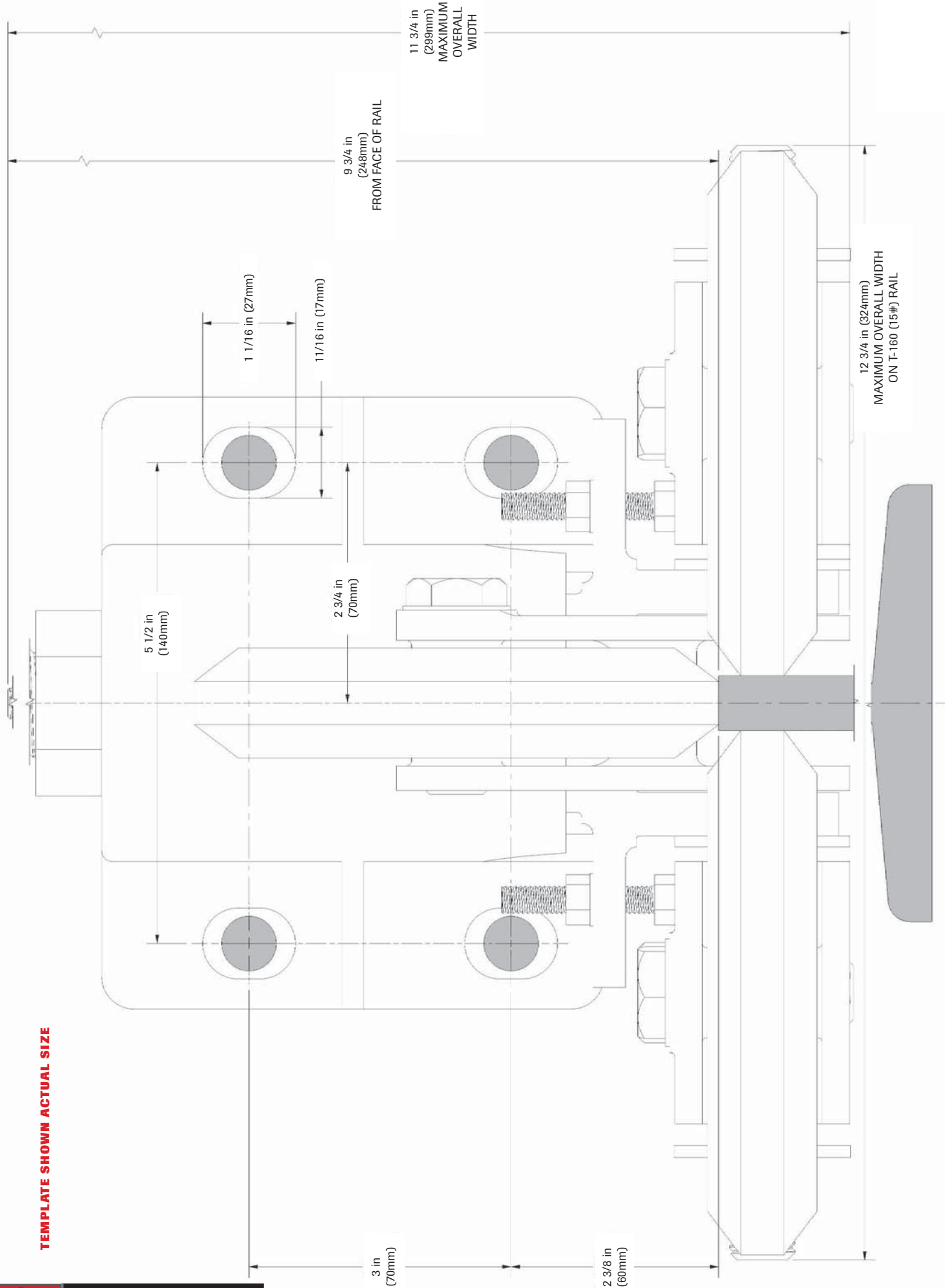


After all adjustments have been made, ride elevator in both the up and down direction at inspection speed to check hoistway clearances. Check to be sure that all mounting bolts and/or nuts, and adjustment locknuts are securely tightened. Make several more runs at operating speed, then recheck float, tracking and roller wheel pressures before returning elevator to service.

While polyurethane roller wheels can operate at pressures up to 300 lbs. (140 kg) per wheel, it is advisable to keep static pressure as low as possible to prevent flat spots from forming while the elevator is sitting. Flat spots can adversely affect ride quality by causing a rough and/or noisy ride. At higher pressures, it may not be possible to skid the roller wheels by hand.



TEMPLATE SHOWN ACTUAL SIZE





SPECIFICATIONS

Size and Weight

Height, Overall	18-1/2"	(470mm)
Width on 30 lb., 1-1/4" Rail	13-1/4"	(337mm)
Width on 15 lb., 5/8" Rail	12-5/8"	(321mm)
Depth, Overall Maximum	11-3/4"	(298mm)
Shipping Weight	61 lbs.	(27.7kg)

Mounting Bolt Holes

Four Slots	11/16" x 1-1/16"	(17mm x 27mm)
Bolt Hole Locations	Refer to Mounting Template	

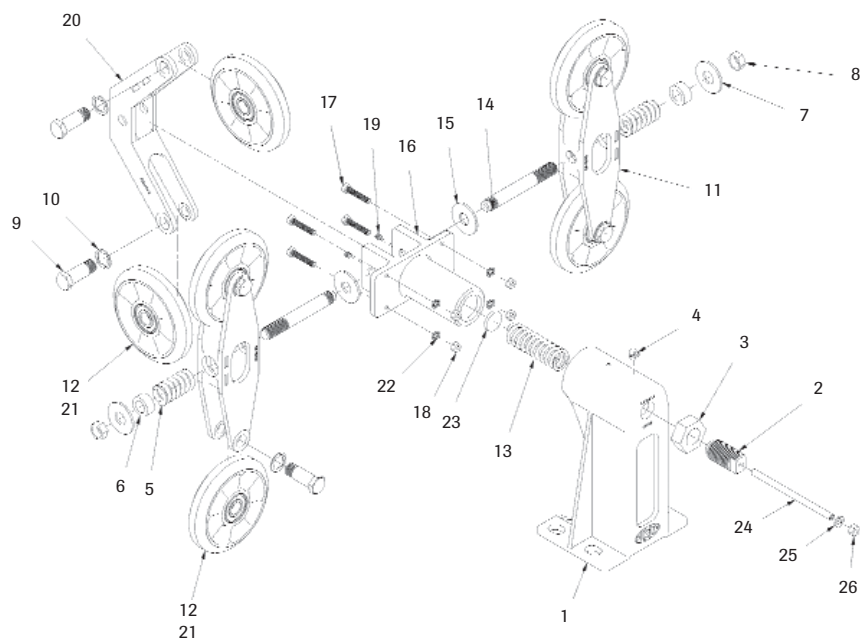
Roller Wheels

Thickness	1-1/4"	(32mm)
Neoprene Tread Width (face & side arm roller wheel)	1/2"	(13mm)
Polyurethane Tread Width (face roller wheel)	1/2"	(13mm)
Polyurethane Tread Width (side arm roller wheel)	7/8"	(22mm)
Diameter	6"	(152mm)
Bearing I.D.	0.7874"	(20mm)
Runout (Total Indicator Reading)	0.002"	(.051mm)

Options and Factory Modifications Available

- Polyurethane composition roller wheels can be used to replace standard neoprene wheels in selected applications. Refer to the ELSCO guide selector chart or call an ELSCO guide specialist to determine proper applications. See our Frequently Asked Questions (FAQ) for more information about the trade-offs between neoprene and polyurethane wheel compositions.
- Cover plate kits are in stock and available for added safety and protection.
- Seismic retainer plates are available for select rail sizes. Call or e-mail for more information.

PARTS LIST



Model A Roller Guide

Key	Req.	Part #	Description
1	1	EA18354	Bracket
2	1	EA18327	Hub Adjustment Screw
3	1	EA19763	Hub Adjustment Locking Nut
4	1	EA18362	Grease Fitting
5	2	EA18379	Side Arm Spring
6	2	EA18307	Fiber Sleeve
7	2	EA18373	Flat Washer
8	2	EA18376	Locknut
9	6	EA18375	Wheel Stud
10	6	EA18388	Wheel Stud Lock Washer
11	2	EA18365	Side Arm
12	4	Rail Side Roller - See Roller Wheel Options Below	
13	1	EA18380	Hub Spring
14	2	EA18377	Side Arm Stud
15	2	EA18378	Rubber Washer
16	1	EA19727	Hub
17	4	EA19387	Side Arm Tracking Screw
18	4	EC18428	Hex Nut
19	2	EA19765	Set Screw
20	1	EA19729	Face Arm
21	2	Rail Face Roller - See Roller Wheel Options Below	
22	4	EF04131	Lock Washer
23	1	EA18328	Solid Stop Washer
24	1	EA18326	Adjustable Stop Adjustment Screw
25	1	EA18330	Lock Washer
26	1	EA18329	Nut
Standard Roller Wheel Configuration for Typical Installations:			
12	4	EA18359	Standard Neoprene Roller Wheel Assembly, 6 in. (152mm)
21	2	EA18359	Standard Neoprene Roller Wheel Assembly, 6 in. (152mm)
Polyurethane Roller Wheel Configuration for Heavy-Duty Installations:			
12	4	EA18347	Polyurethane Roller Wheel Assembly, 6 in. (152mm) - Rail Side
21	2	EA18348	Polyurethane Roller Wheel Assembly, 6 in. (152mm) - Rail Face

Notes:

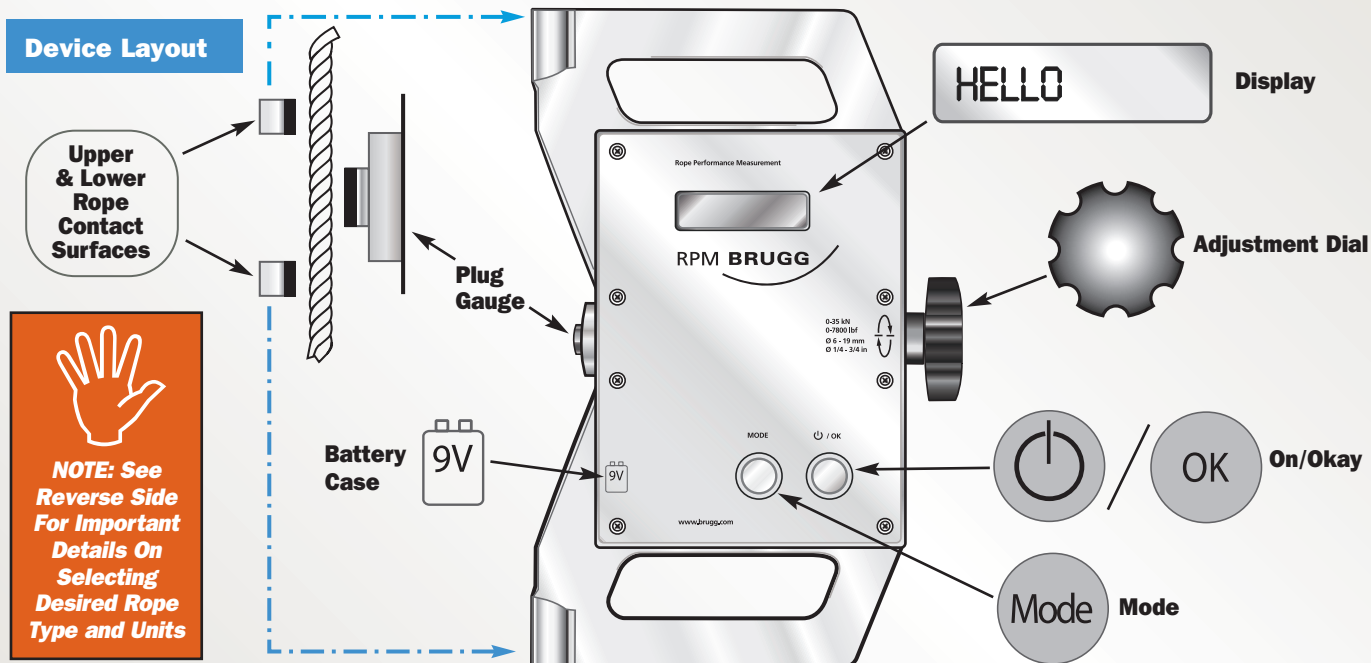
- Top Level Assembly for Model A Roller Guide with Std. Neoprene Rollers is EA18300.
- Top Level Assembly for Model A Roller Guide with Polyurethane Rollers is EA18306.
- Parts can be ordered together as a kit under part no. EA18331.
- Parts cannot be ordered individually, and must be ordered as a complete subassembly.
- Neoprene rollers are identical for rail side and face.
- Polyurethane rollers use different tread widths for rail side and rail face.



BRUGG

TECH TIPS: RPM

USER MANUAL



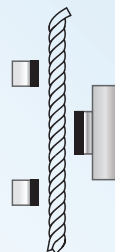
Measuring Mode

STEP 1



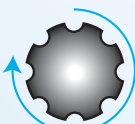
First turn adjustment dial **counterclockwise** to open plug gauge.

STEP 2



Now insert rope between contact surfaces and device plug gauge.

STEP 3



Turn adjustment dial **clockwise** to close plug gauge. Keep turning until you hear a beep.



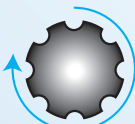
XX.X mm

OR

.XXX INCH

Your **diameter** is now displayed in metric or imperial units.

STEP 4



Continue to turn adjustment dial **clockwise** until you reach 100% and hear another beep.



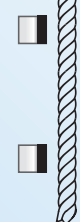
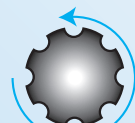
XX.XX kN

OR

XXXX LBF

Your **tension** is now displayed in metric or imperial units.

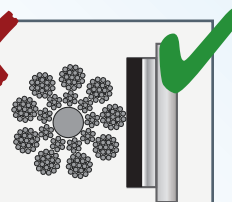
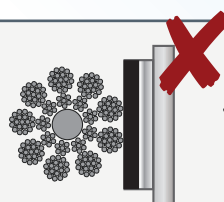
STEP 5



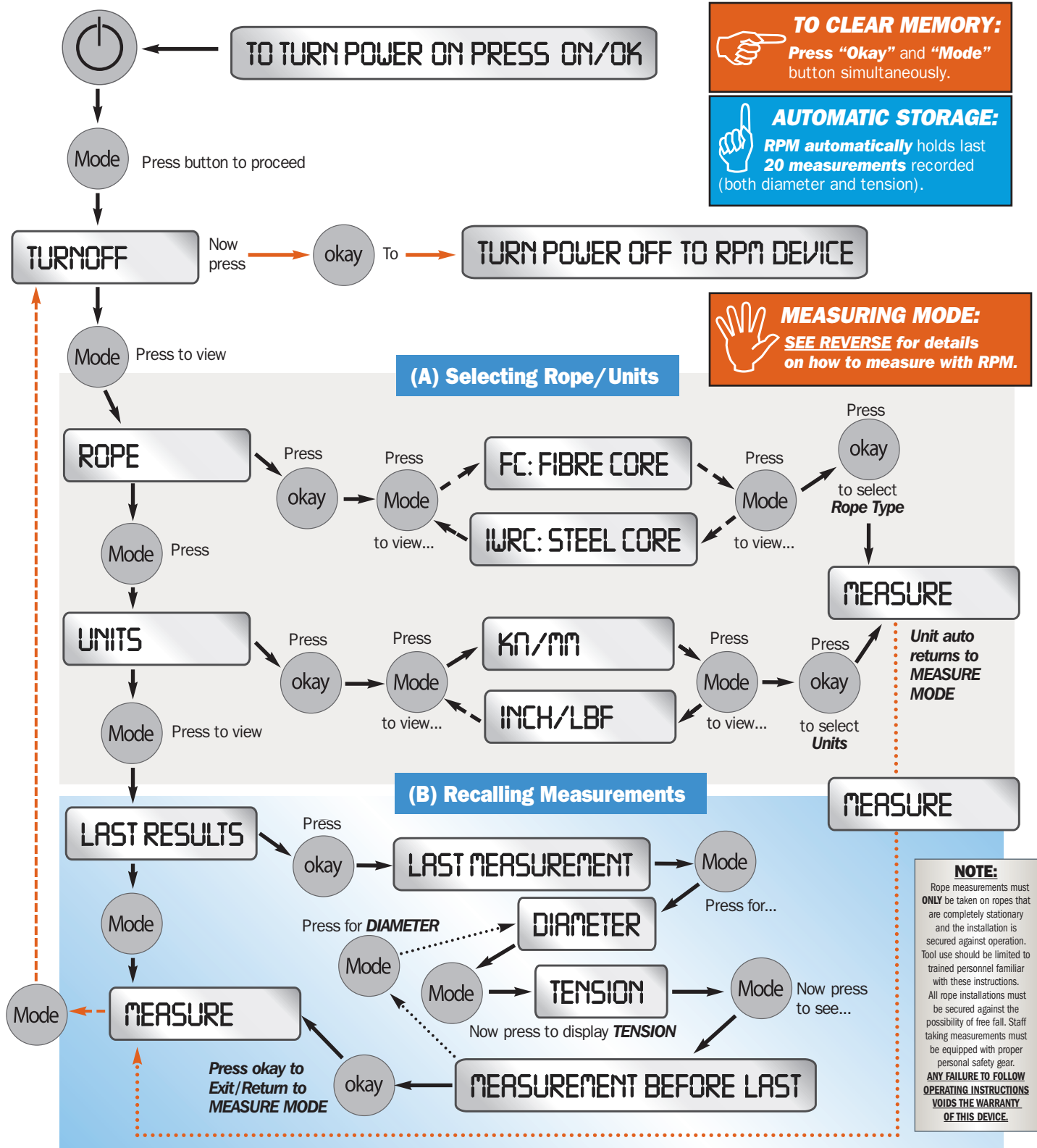
Now turn dial **counterclockwise** to remove rope from RPM.

STOP!

DO NOT perform repeated measurements at the same rope position.



How To Select Type Of Rope or Required Units (A) and Recall Hoist Rope Measurements (B)





Motion Control Engineering®

A Kinetek Company®

Maintenance

Elevator Maintenance Documents

Documents required to properly maintain an MCE elevator include:

- MCE Controller manual
Motion 4000 Controller manual - Included with the controller.
-OR-
iControl AC Controller manual - Included with the controller.
- Controller wiring diagrams
Per specific job - Included with the controller.
- Imperial Electric Motor Data Manual for specific machine.
- GAL, SmarTraQ, or as shipped door operator manual.
- TorqMax F5 Drive manual - Included with the controller.

Additional maintenance information contained in this manual:

- General Information, [page 6-2](#)
- Minimum Maintenance Schedule, [page 6-3](#)
- Car and Counterweight Safety information, [page 6-5](#)
- Suspension Rope information, [page 6-15](#)
- Overspeed Governor information, [page 6-39](#)
- Guide Rail information, [page 6-43](#)
- Roller Guides, [page 6-44](#)
- Oil Buffer information, [page 6-44](#)
- Driving Machine, [page 6-50](#)
- Door Operator, [page 6-54](#)

General Information

MCE uses quality components from several manufacturers. We provide single-site support for all equipment that is part of the installation package we sell. Please contact:

- Motion Control Engineering
Voice: 916 463 9200
Fax: 916 463 9201
Web: www.mceinc.com

General Requirements

Maintenance, repairs, and replacements of equipment shall conform to Section 8.6 of ASME A17.1/CSA B44, to code at the time of installation and to code requirements at the time of any alteration.

Safety

If any defective part directly affects operational safety, the equipment shall be taken out of service until the part has been adjusted, repaired, or replaced.

Records

The contracting organization responsible for maintaining the elevator equipment shall create, maintain, and keep available written records including:

- Description of task performed and dates.
- Description and dates of examinations, tests, adjustments, repairs, or parts replacement.
- Description and dates of call backs and issue reports, including corrective actions taken.
- Records of findings on firefighter's service operation required by ASME 8.6.10.1.
- Records must be available to elevator personnel.

Copies of maintenance and call back forms are included at the back of this manual, [page 6-60](#).



Danger

Safety Devices shall not be rendered inoperative or ineffective except where necessary during tests, inspections, maintenance, repair, and replacement and only after the equipment has been removed from service. All safety devices must be restored to their normal operating conditions prior to returning equipment to service.

Detailed Check List

A detailed check list of all equipment and suggested checks is provided on [page 6-62](#).

Minimum Maintenance Schedule

This schedule represents the minimal required maintenance for the installation.

- Each time you are at the site, visually inspect all equipment to be certain it is operating properly and has no visible damage or wear.
- Ensure that equipment is kept clean and lubricated if required.
- This is a guideline schedule for an average installation, unusual or harsh conditions like high usage, dust, abrasives, moisture, grease, chemicals, abnormal temperatures, etc., will require more frequent attention to equipment.

Table 6-1 Minimum Maintenance Guideline Schedule

Frequency/Equipment	Procedure
Weekly Initial Requirements	Requirements for 8 weeks immediately after commissioning
Suspension Ropes/Connections	Check and maintain specified runby clearances per job drawings. 6-18 -> Check for indications of unusual wear. 6-15 -> Check rope terminations and tension. 6-17 ->
Levelling Accuracy	Check landing accuracy at all landings.
Doors	Check proper door operation and door safety devices. 6-54 ->
Machine	Check alignment of drive and driven sheaves. Check for unusual wear. Check for proper brake application and brake surface contact. 6-50 -> Check machine lubrication. 6-50 ->
Monthly	
Elevator Controller & Drive (Refer to controller manual)	Check for excessive dust or moisture. Check for proper status indicator operation. Check for fault indication / examine fault logs. Check for loose connections. Clean machine room or space Refer to manual for Motion 4000 or iControl AC as appropriate.
Car/Counterweight Safeties	Check for visible damage. 6-5 -> Check for proper linkages. 6-5 -> Check rail clearances. 6-5 ->
Suspension Rope/Connections	Check for proper lubrication. 70 -> Check sheave alignment. Ride test for car vibration. Visually check for signs of wear. 69 -> - 73 -> Verify no missing or broken isolation springs.
Speed Governor	Check governor rope is dry and clean. (NEVER lubricate governor rope.) Check governor rope is unobstructed 92 -> - 100 -> Check linkages, gears, pins, collars, bushings, latches. 92 -> - 100 -> Manually operate switches and reset mechanism. 92 -> - 100 -> Check for damage or distortions to structure. 92 -> - 100 -> Check governor and sheave grooves. 92 -> - 100 -> Check fastenings are secure. 92 -> - 100 ->
Guide Rails	Visually check that rails are clean and rust free. 6-43 -> Clean if needed. 6-43 -> Visually check rail alignment and fastenings. 6-43 -> Guide adjustment. 6-43 ->
Buffers	Visually check mountings and alignment. 6-44 -> Visually check oil buffers for any sign of leakage.
Machine	Visually check for wear, debris, leakage or overheating. 6-50 -> Clean using a dry cloth. Check brake application and contact. 6-50 ->

Table 6-1 Minimum Maintenance Guideline Schedule

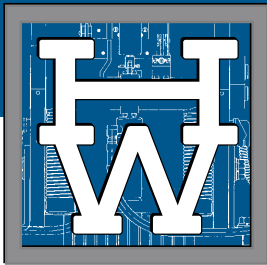
Frequency/Equipment	Procedure
Doors	Check proper door operation and door safety devices. 6-54 ->
General	Ride each elevator. Observe operation and sound. Check and replace any burned out indicator bulbs. Check for tripping hazards. Clean machine space and pit. Inspect and clean car top. Check traveling cables for tracking and wear. Refer to Motion 4000 or iControl AC controller manual as appropriate.
3 Months	
Machine	Lubricate lower brake arm shaft and brake shoe pivot shaft as instructed in the manufacturer manual.
6 Months	In addition to monthly checks
Suspension Ropes/Connections	Verify equal rope tension. 6-17 -> Check rope diameter. 6-15 -> Check wire condition. 6-15 -> Verify identification tags present.
Speed Governor	Check for damage or distortion to structural elements. 6-39 -> Lubricate rocker lever if needed.
Guide Rails	Verify all joints secure and aligned. 6-43 -> Verify all clips and brackets secure and undistorted. Verify rail mounted devices securely in place.
Buffers	Check securely mounted and fastened (buffer/stand). 6-44 -> Check vertical and aligned with striker plates Verify springs properly seated. Verify no spring deformation, weakening, or damage. Verify marking plates in place. Verify extended buffers are correct height. Physically check oil levels.
Machine	As directed in the manufacturer manual: Check brake shoe lining and clearance. 6-50 -> Lubricate machine. 6-50 -> Adjust brake. 6-50 ->
General	Check emergency lights, signalling, and operation. See controller manual. Check car handrails, ceiling and hanging panels. Check, clean, and lubricate roller guides. See elevator install manual, 42-02-EP01. Check, clean, and lubricate door operator and door operating linkages and switches. See SmarTraq Manual, 42-02-D007. Check and clean positioning system. See controller manual.
12 Months	
Machine	As directed in the manufacturer manual: Lubricate brake solenoid. Lubricate brake rod and spring washer assembly.
As Required	Per code
All components	System tests as described in Pre-inspection/Inspection Guide 42-02-EP03.



Please refer to table of contents and index for additional direction.

Car and Counterweight Safeties

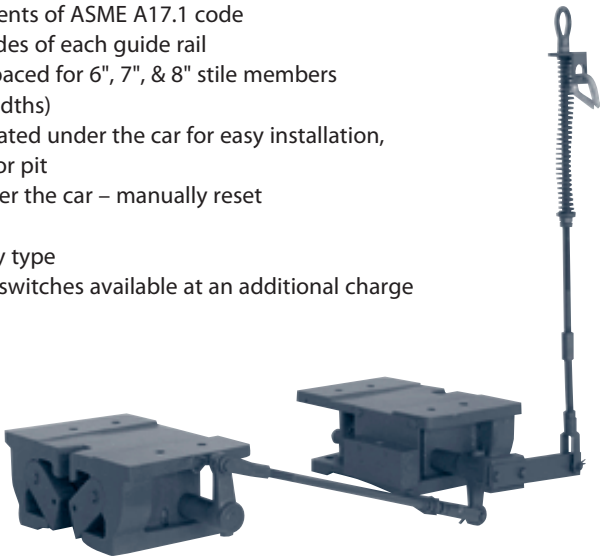
TYPE "A" INSTANTANEOUS SAFETY



Choose the Hollister-Whitney Type "A" Instantaneous Safety for these important features:

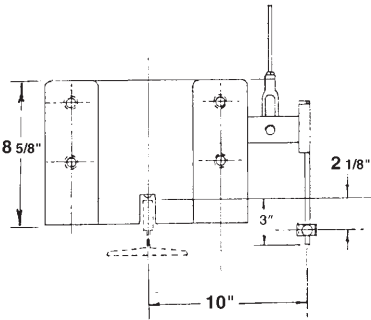
- Designed in compliance with all requirements of ASME A17.1 code
- Stopping force exerted equally on both sides of each guide rail
- Simple mounting under plank channels spaced for 6", 7", & 8" stile members (Adapter plates available for other stile widths)
- All operating linkage is adjustable and located under the car for easy installation, inspection, and maintenance from elevator pit
- Car safety switch operated by linkage under the car – manually reset for maximum safety
- Arranged for mounting guide shoes of any type
- Dusttight, watertight, and explosionproof switches available at an additional charge

Shoe assemblies #371 and #381 will mount to #540 safety without needing adapter plates. All other shoes require adapter plates.



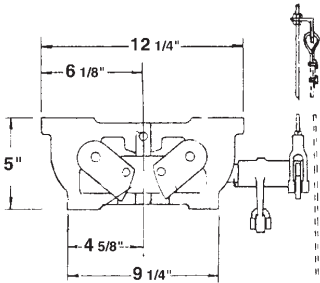
MODEL (SHIP WEIGHT 175#)	540
MAXIMUM LOAD (CAR + CAPACITY + COMPENSATION)	20,000 LBS. (15,000 Lbs. IN WISC. & PA.)
MAXIMUM CAR SPEED	150 F.P.M. (100 F.P.M. IN PA.)
MAXIMUM TRIPPING SPEED	210 F.P.M.
RAIL SIZE	8, 11, 12, 15, 18.5 & 22.5 Lbs.

NOTE: THIS MODEL MEETS ASME CODE A17.1 REQUIREMENTS. IT IS NOT APPROVED IN THE STATE OF CALIFORNIA.



When Ordering Safeties, Please Specify the Following:

- Car Speed • Face to Face of Guide Rails
- Rail Size • Governor Location
- Stile Size • Type of Guide Shoes to be Used



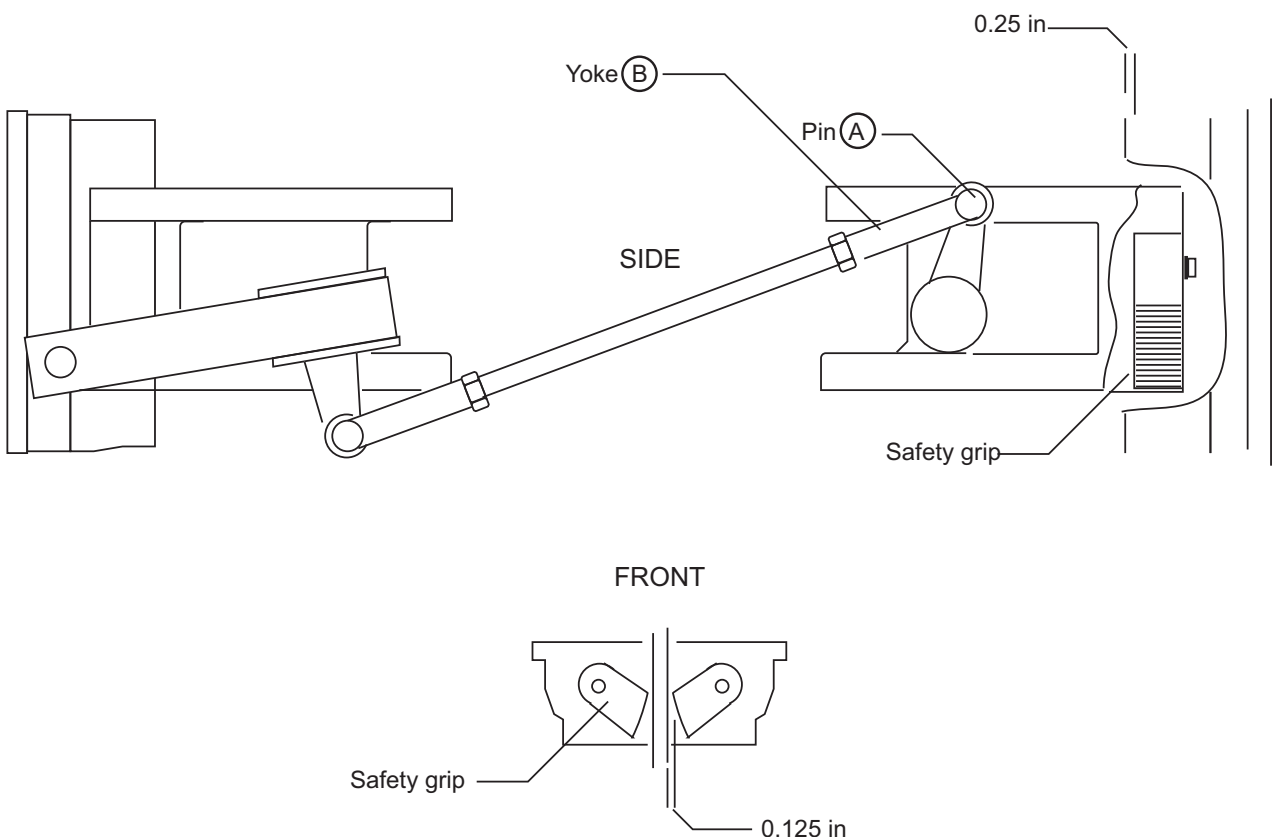
#540 Instantaneous Safety

1. After bolting safety blocks to underside of car sling bottom channel, center safety on rail. There should be approximately 1/8" between side of rail and face of grip. Also, inside edge of grip should be approximately 1/4" back from face of rail.
2. Due to motion lag, linkage must be adjusted to advance grips (on opposite side of governor) to contact rail before grips on governor side. To accomplish this advancement:
 - Set all four grips to engage rail at same instant.
 - Remove pin A and thread yoke B one full turn toward governor side of car. Re-insert pin A.
3. To insure proper operation of safety, the guide rails must be clean. Lubricate with rail oil or light coat of Nylub if required.

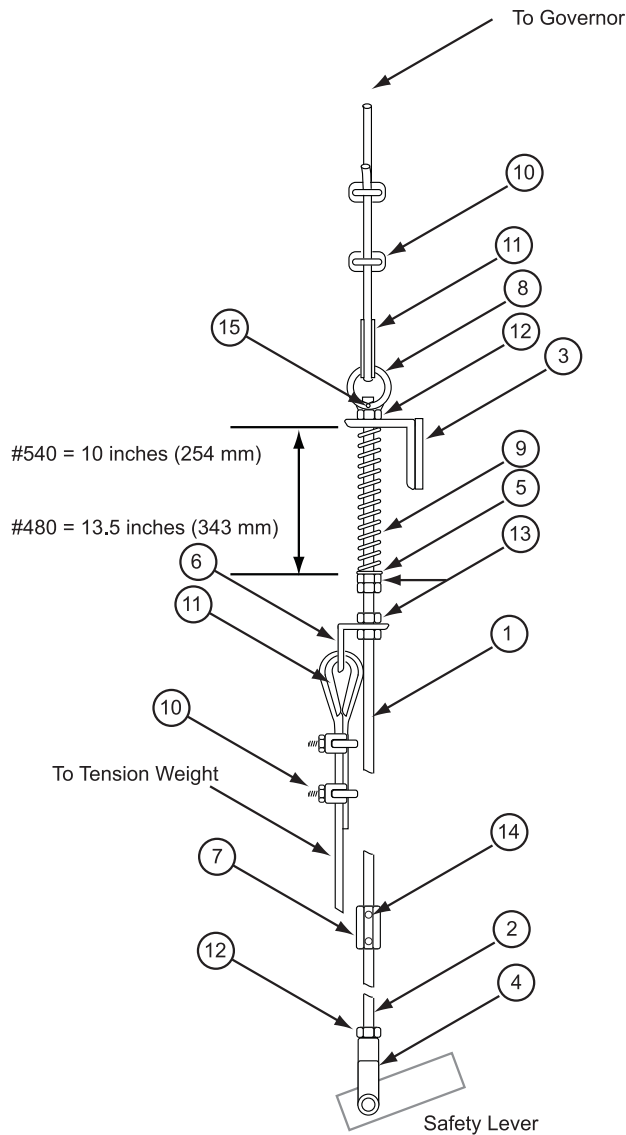


Note

NOTE: No safety lubrication is required.



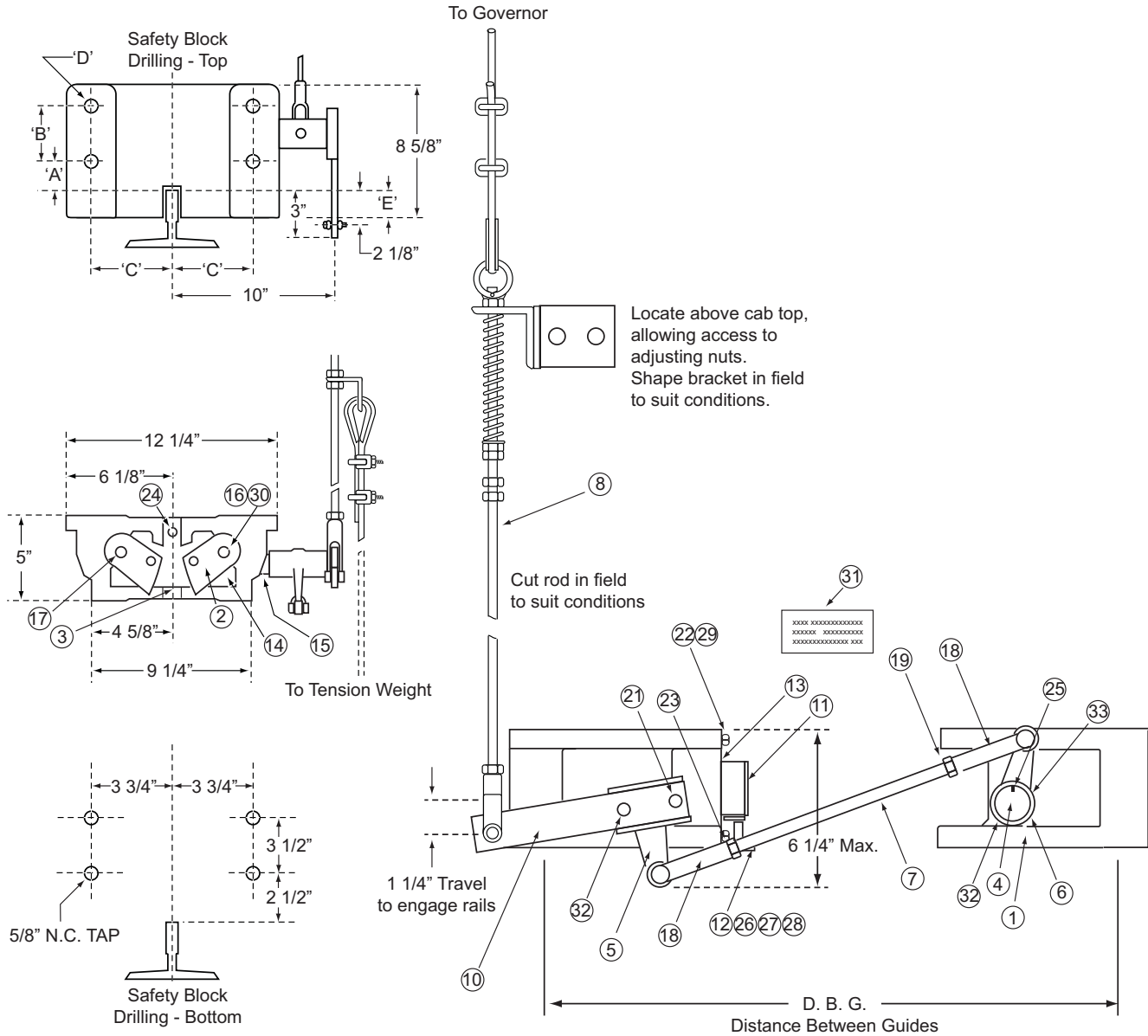
The linkage assembly pictured below is used on both the 540 and 480 safeties. Differences are called out.



NO.	PART NO.	QTY.	DESCRIPTION
1	540-8	1	ROD - GOV. (TOP)
2	540-8-1	1	ROD - GOV. (BOTTOM)
3	540-9	1	BRACKET - GOV. ROD
4	540-18	1	YOKE w/ 1/2" PIN (R.H.)
5	540-19	1	RETAINER - SPRING
6	540-22	1	ANGLE - GOV. ROD
7	540-23	1	COUPLING (Chicago Line)
8	540-24	1	YOKE - RING (Buckeye #4050)
9 (A)	400-65	1	SPRING (540 SAFETY ONLY)
9 (B)	400-68	1	SPRING (480 SAFETY ONLY)
10	3/8"	4	CLIP - CABLE
11	3/8"	2	THIMBLE - CABLE
12	1/2" N.C.	2	NUT - STD.
13	1/2" N.C.	4	NUT - JAMB
14	1/8" x 3/4"	2	PIN - ROLL
15	1/8" x 1 1/4"	1	PIN - COTTER

Reproduction of HOLLISTER-WHITNEY

GOVERNOR ROD ASSEMBLY
Assembly Sheet: 480-25 and 540-25



FOR USE ON 8, 11, 12, 15, 18 1/2, and 22 1/2 # RAILS

TYPE "A" INSTANTANEOUS SAFETY

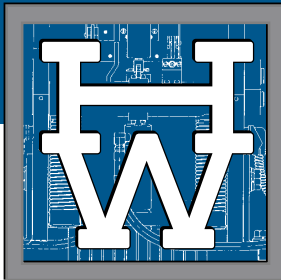
STILE	"A"		"B"		"C"		"D"		"E"	
	8# ONLY	OTHER							8# ONLY	OTHER
6"	2 1/4"	2"	3"	4 1/8"	5/8" TAP - 11 THD. - 4 HOLES				1 1/4"	1 1/2"
7"	3 1/4"	3"	3"	4 5/8"	11/16" DRILL - 4 HOLES				1 1/4"	1 1/2"
8"	2 1/4"	2"	3"	5 1/4"	11/16" DRILL - 4 HOLES				1 1/4"	1 1/2"

SEE TABLE ON FOLLOWING PAGE FOR KEY NUMBERS

540 Instantaneous safeties have a maximum tripping speed of 210 FPM and a maximum gross load of 20,000 pounds.

Table 6-2 Parts List, #540 Instantaneous Safety

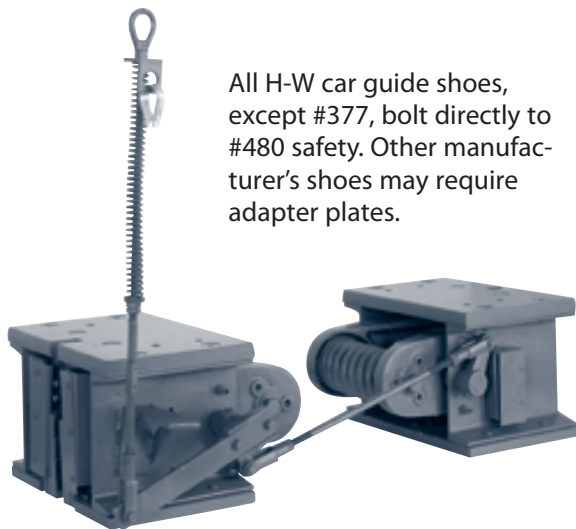
NO.	PART NO.	QTY.	DESCRIPTION
1	540-1	2	Block (8, 11, 12, 15# Rails)
	540-1-1	2	Block (22-1/2 Rail Only)
	540-1-2	2	Block (18-1/2# Rail Only)
2	540-2	4	Grip (8, 11, 12, 15# Rails)
	540-2-1	4	Grip (18-1/2# Rail Only)
	540-2-2	4	Grip (22-1/2# Rail Only)
3	540-3	2	Arm Grip
4	540-4	2	Shaft
5	540-5	1	Arm - Lever
6	540-6	1	Arm - Linkage Rod
7	540-7	1	Rod - Linkage
8	540-25	1	Governor Rod Assembly
9			
10	540-10	1	Lever (11, 12, 15, 18-1/2, 22-1/2 # Rails)
	540-10-1	1	Lever (8# Rail Only)
11	201-23	1	Switch
12	540-36-1	1	Actuator - Switch (Right Hand Governor)
	540-36-2	1	Actuator - Switch (Left Hand Governor)
13	540-13	1	Plate - Switch
14	540-14	2	Spacer - 1 5/8"
15	540-15	1	Spacer - 2 1/4"
16	540-16	4	Pin - Grip
17	540-17	4	Stud - Grip
18	540-18	2	Yoke - w/ pin (1/2") 1 R.H. and 1 L.H.
19	1/2" N.C.	1	Nut - Std (L.H.)
20			
21	3/8" N.C. x 3/4"	2	Screw - Hex Head Cap
22	1/4" N.C. x 3/4"	2	Screw - Hex Head Cap
23	1/4" N.C. x 1/2"	2	Screw - Hex Head Cap
24	#14 x 1/2"	1	Screw - Drive (8# Rail Only)
25	1/4" x 1-1/4"	4	Key
26	1/2" N.C.	3	Nut - Jamb
27	1/2"	1	Washer - Plain
28	1/2"	1	Washer - Star
29	1/4"	2	Washer - Lock
30	5133-50	4	Ring - Truarc
31		1	Plate - Data w/ pins (ships loose)
32	540-20	4	Bushing - Oilite
33	540-21	1	Spacer - 2-5/8"



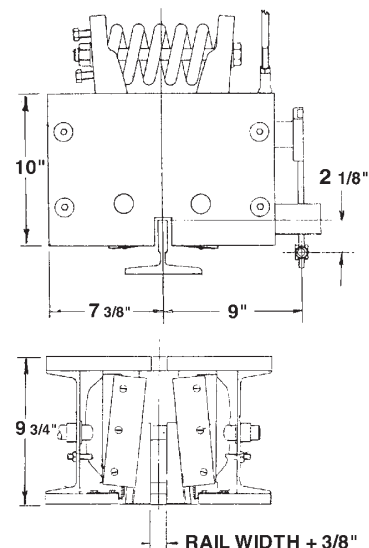
TYPE "B" FLEXIBLE GUIDE CLAMP SAFETY

The Hollister-Whitney Type "B" Flexible Guide Clamp Safety is Superior in Construction and Offers Many Important Features:

- Designed in compliance with all requirements of ASME A17.1 code
- Stopping force automatically exerted equally on both sides of each guide rail and readily adjustable through compression spring on each safety block
- Full swivel of rail grips provides full and uniform contact on all rail faces when safety is actuated
- Simple mounting under plank channels spaced for stile members of any size
- All operating linkage is adjustable and located under the car for easy installation, inspection, and maintenance from elevator pit
- Car safety switch operated by linkage under the car and automatically resets
- Arranged for mounting guide shoes of any type
- Dusttight, watertight, and explosionproof switches available at an additional charge



All H-W car guide shoes, except #377, bolt directly to #480 safety. Other manufacturer's shoes may require adapter plates.



MODEL (SHIP WEIGHT 400#)	480	481	480	481
MAXIMUM LOAD (CAR + CAPACITY + COMPENSATION)	15,000 Lbs.	20,000 Lbs.	13,000 Lbs.	18,000 Lbs.
MAXIMUM CAR SPEED	500 F.P.M.	500 F.P.M.	800 F.P.M.	800 F.P.M.
MAXIMUM TRIPPING SPEED	625 F.P.M.	625 F.P.M.	970 F.P.M.	970 F.P.M.
RAIL SIZE	All except 8 Lb.	18.5, 22.5 & 30 Lb.	All except 8 Lb.	18.5, 22.5 & 30 Lb.

NOTE: ALL MODELS, INCLUDING THOSE DESIGNED TO BE USED IN HIGHER SPEED APPLICATION, MEET ASME CODE A17.1 REQUIREMENTS. IN ADDITION, MODEL #480, FOR 500 F.P.M. AND BELOW, IS APPROVED FOR V.A., G.S.A. AND STATES OF CALIFORNIA, PENNSYLVANIA, AND WISCONSIN. ALSO, MODEL #481, FOR 500 F.P.M. AND BELOW, IS APPROVED FOR STATES OF PENNSYLVANIA AND WISCONSIN.

When Ordering Safeties, Please Specify The Following:

- Car Speed • Face to Face of Guide Rails • Rail Size • Governor Location • Stile Size
- Type of Guide Shoes to be Used • Gross Load (Empty Car Weight & Capacity)

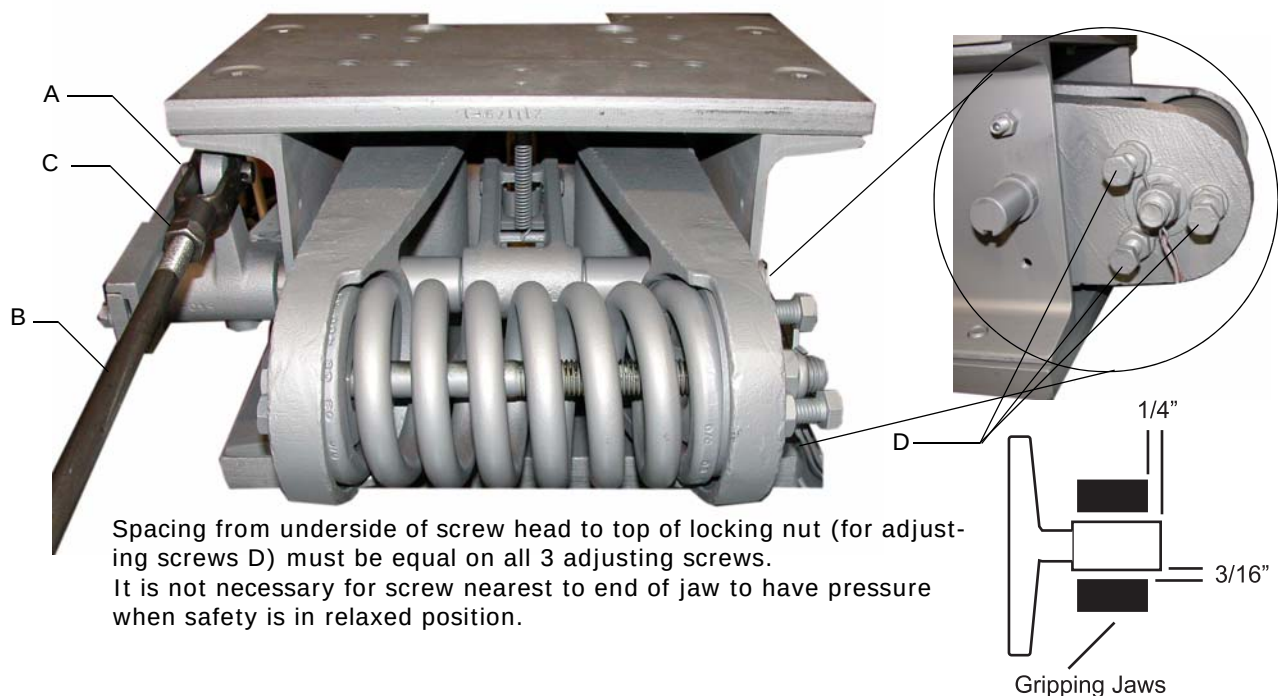
#480 Flexible Guide Clamp Safety

The #480 Safety has been preset to produce 3/16" rail clearance (face of grip to side of rail), and the spring pressure has been preset to produce a slide in accordance with A17.1 Elevator Code requirements. However, due to possible variances in rail surfaces, car weights, etc., safety springs E may have to be re-adjusted in the field.

1. After bolting safety blocks to underside of car sling bottom channel, center safety on rail. There should be approximately 3/16" between side of rail and face of grip. Also, inside edge of grip should be approximately 1/4" back from face of rail.
2. Raise safety actuating lever A slowly until grips touch side of rail. All four grips must engage rail at the same instant. To accomplish this simultaneous engagement, loosen nut C and adjust rod B.
3. Set governor pull-thru at 400 pounds.
4. To insure proper operation of safety, the guide rails must be clean, dry, and free of rust. If lubrication is required, a light coat of Nylub may be used.
5. After checking level of platform, apply safety at leveling speed. Recheck level of platform for any possible rack. If car shows rack, repeat Step 2 before conducting leveling test again.
6. Apply safety at contract speed and check level of platform as done in Step 5. Top of grips must be hard-up against underside of top plate. Any malfunctions will show up on leveling or contract speed test.

If the safety does not produce a slide to satisfy your specifications, re-adjust spring pressure as follows:

1. Tighten adjusting screws D to shorten slide, loosen to lengthen slide.
2. Limit adjustment of adjusting screws to 1/8" increments.
3. All adjusting screws D must be equally adjusted.



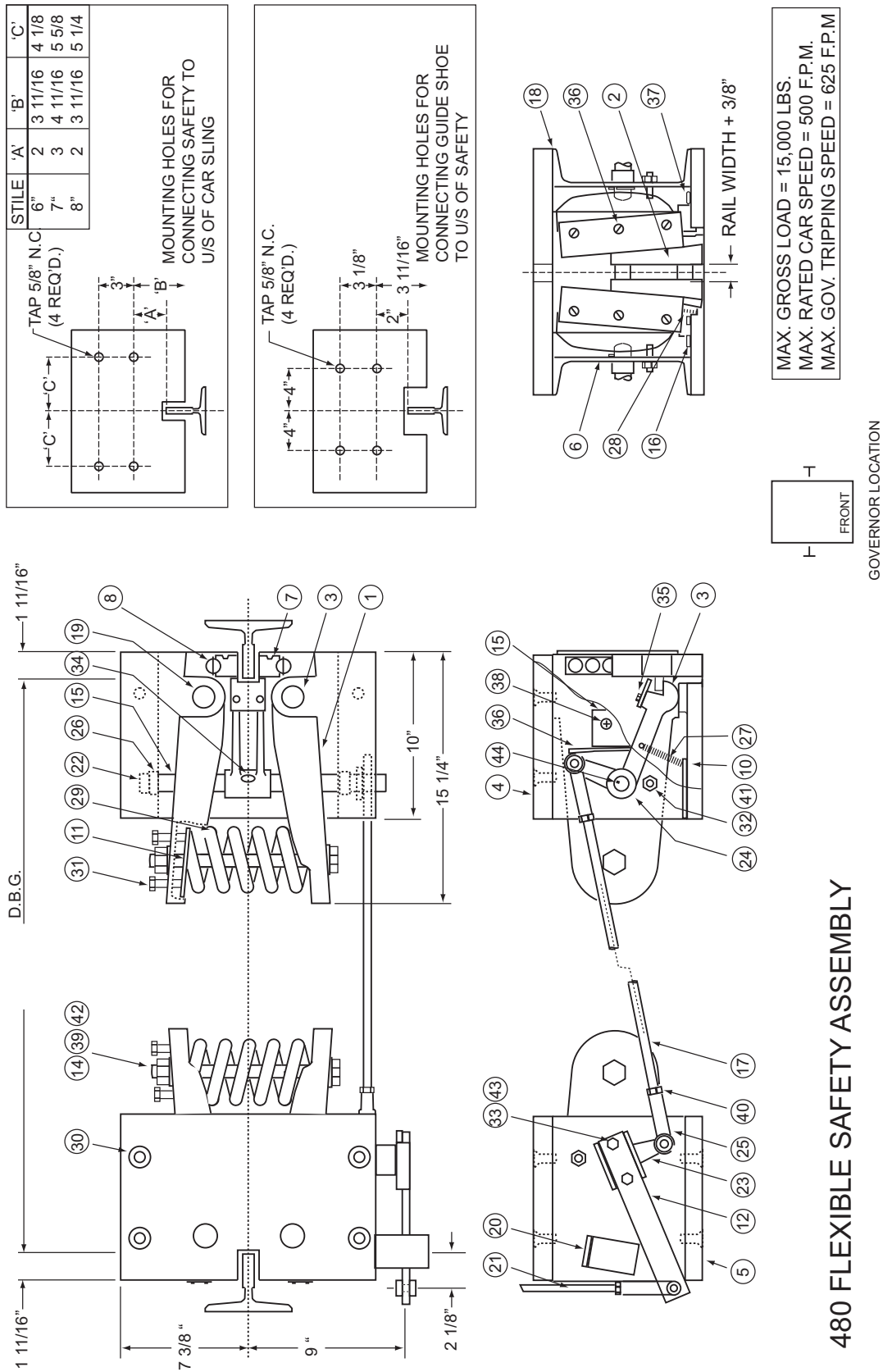


Table 6-3 Parts List, #480 Flexible Guide Clamp Safety

NO.	PART NO.	QTY.	DESCRIPTION
1	480-1	4	Jaw - (2 R.H., 2 L.H.)
2	480-2	4	Grip - (2 R.H., 2 L.H.) 11, 12, 15, 22 1/2# Rails
	480-2-1	4	Grip - (2 R.H., 2 L.H.) 18 1/2, 30# Rails
3	480-3	2	Arm -Grip 11 thru 18 1/2# Rails
	480-4	2	Arm - Grip 22 1/2, 30# Rails
4	480-4	2	Plate - Top 11 thru 18 1/2# Rails
	480-4-1	2	Plate - Top 22 1/2, 30# Rails
5	480-5	2	Plate - Bottom 11 thru 18 1/2# Rails
	480-5-1	2	Plate - Bottom 22 1/2, 30# Rails
6	480-6	4	Channel
7	480-7	4	Retainer - Grip
8	480-8	4	Retainer - Ball
9	480-9	4	Pin - Jaw
10	480-10	2	Bracket - Grip Arm Spring
11	480-11	2	Seat - Spring 11 thru 18 1/2# Rails
	481-11	2	Seat - Spring 22 1/2, 30# Rails
12	480-12	1	Lever
13	480-13	4	Spacer 11 thru 18 1/2# Rails
	481-13	2	Spacer 22 1/2, 30# Rails
14	480-14	2	Bolt - Spring Retainer
15	480-15	1	Switch Assembly
16	480-16	4	Bracket - Ball Retainer Spring
17	480-18	1	Rod - Linkage
18	480-19		Shim (If Required)
19	480-20	4	Bushing
20	480-21	1	Stop - Lever
21	480-25	1	Governor Rod Assembly
22	540-4	2	Shaft 11 thru 18 1/2# Rails
	481-37	2	Shaft 22 1/2, 30# Rails
23	540-5	1	Arm - Lever
24	540-6	1	Arm - Linkage
25	540-18	2	Yoke, w/ 1/2" Pin (1 R.H., 1 L.H.)
26	540-20	4	Bushing - Oilite
27	400-66	2	Spring - Grip Arm
28	400-67	4	Spring - Ball Retainer
29	400-	2	Spring - Safety Jaw
30	5/8" N.C. x 1 1/4"	16	Screw - Hex Socket Flat Head Cap
31	1/2" N.C. x 2"	6	Screw - Hex Head Cap
32	3/8" N.C. x 1 3/4"	4	Screw - Hex Socket Set
33	3/8" N.C. x 1"	2	Screw - Hex Head Cap
34	5/16" N.C. x 1/2"	4	Screw - Socket Head Set
35	1/4" N.C. x 3/4"	2	Screw - Hex Head Cap
36	1/4" N.C. x 1/2"	13	Screw - Button Socket Head Cap

Table 6-3 Parts List, #480 Flexible Guide Clamp Safety

NO.	PART NO.	QTY.	DESCRIPTION
37	1/4" N.C. x 1/2"	12	Screw - Hex Head Cap
38	1/4" N.C. x 1/2"	2	Screw - Round Head Cap
39	3/4" N.C.	2	Nut - Self Locking
40	1/2" N.C.	2	Nut - Standard (1 R.H., 1 L.H.)
41	3/8" N.C.	4	Nut - Jamb
42	3/4"	4	Washer - Plain
43	3/8"	2	Washer - Lock
44	1/4" x 1 1/4"	4	Key
45		2	Seal - For California - Install after test

Suspension Rope Information

Hoist ropes stretch about 6" per 100'. The initial, and greatest amount of stretch will take place immediately upon putting the full weight of the car and counterweight on the hoist ropes. Over time they will continue to stretch, but at a much slower rate until they reach their maximum amount of stretch.

Code requires a minimum counterweight runby so, as the ropes stretch they need to be adjusted accordingly. This is accomplished by removing spacer blocks under the counterweight, adjusting the hoist rope shackles, or shortening the hoist ropes. The maximum counterweight runby allowed by Code is calculated, along with other factors, based on the distance from the car crosshead to the underside of the machine beams with the car level at the top landing. With an extremely high rise car, the ropes may be adjusted and/or shortened many times before all the stretch has been removed.

Examination

Check the rope data tag to determine the rope used on a specific installation.

Wire Suspension and Compensating Ropes

1. Wire suspension and compensating ropes shall be replaced
 - (a) if the broken wires are equally distributed among the strands, when the number of broken wires per rope lay in the worst section of the rope exceeds the values shown in column A of Table 8.11.2.1.3 (cc) (1); or
 - (b) if the distribution of broken wires is unequal, and broken wires predominated in one or two strands, when the number of broken wires per rope lay in the worst section of the rope exceeds the values shown in column B of Table 8.11.2.1.3 (cc)(1) or
 - (c) if four or five wires, side by side, are broken across the crown of any strand, when the number of broken wires per rope lay in the worst section of rope exceeds values shown in column C of Table 8.11.2.1.3 (cc)(1); or
 - (d) if in the judgment of the inspector, any unfavorable condition, such as fretting corrosion (red dust or rouge), excessive wear of individual wires in the strands, unequal tension, poor sheave grooves, etc. exists, the criteria for broken wires will be reduced by 50% of the values indicated in Table 8.11.2.1.3 (cc)(1) for any of the three conditions described above; or
 - (e) if there is more than one valley break per rope lay.

Table 6-4 ASME Table 8.11.2.1.3 (cc)(1) Wire Suspension and Compensation Ropes

Types of Wire Rope	A [Note (1)]	B [Note (1)]	C [Note (1)]
6 x 19 class	24 - 30	8 - 12	12 - 20
9 x 19 class	32 - 40	10 - 16	16 - 24

GENERAL NOTE: 6 x 19 class rope has 6 strands with 16 to 26 wires per strand. 8 x 19 class rope has 8 strands with 16 to 26 wires per strand.

NOTE (1): The upper limits may be used when inspections are made monthly by a competent person.

Nominal Diameter Guidelines

- On any type of elevator, the suspension compensation and governor ropes shall be replaced when their actual diameter is reduced below the value shown in Table 8.11.2.1.3(cc) 3.

Table 6-5 ASME Table 8.11.2.1.3 (cc)(3)

Nominal Size, in.	Maximum Reduced Diameter, in.
3/8 • (9.5 mm)	11/32 • (8.7 mm)
7/16 • (11.0)	13/32 • (10.3 mm)
1/2 • (12.7 mm)	15/32 • (11.9 mm)
9/16 • (14.3 mm)	17/32 • (13.5 mm)
5/8 • (16.0 mm)	37/64 • (14.7 mm)
11/16 • (17.5 mm)	41/64 • (16.3 mm)
3/4 • (19.0 mm)	45/64 • (17.9 mm)
1 • (25.4 mm)	15/16 • (23.8 mm)

Maintenance

Rope should be inspected on a regular basis.

- Review drive and car sheaves and verify they are accurately aligned.
- Be sure to perform a termination tie-down. (Isolation of sockets to prevent spinning out).
- Verify there are no missing or broken isolation springs on the shackles.
- Verify that rope identification tags are present and all information is easily readable and complete.
- Lubrication is ABSOLUTELY CRITICAL. Follow manufacturer guidelines and apply a generous amount of lubrication.
 - Touch a rope with your finger. You should see a smudge and feel oil. If not, the ropes are ready for lubrication.
- Be sure to periodically test tension equalization and adjust hoist ropes correspondingly.
 - This requires an accurate tool. Whichever tool you choose, follow the manufacturer's instructions carefully. Please refer to RPM directions included with OEM inclusions referenced on [page 5-13](#).
- Increased (or increasing) car motion resistance can be a sure sign of mechanical problems such as bad roller guides.
- Excessive car vibrations can be caused by either electrical (drive systems) or mechanical problems in system operation.
- Any hoistway impediment or obstruction that contacts a rope can cause damage or wear. Make adjustments to eliminate them.
- Extreme dirt, cement dust, and other environmental contaminants will adversely affect hoist ropes. Also be aware of humidity or A/C venting into the hoistway onto the ropes as this can hurt the ropes.
- Be sure to properly shorten (or take-up) ropes. Failure to do so can lead to rope twists, tension imbalances or improper rope shackling.

Lubrication

New Rope Adjustment

- New rope must be checked and adjusted as necessary every two weeks over a period of at least two months after initial installation.
- Six months after installation, the rope shall have settled and equal tension (+/- 10%) shall be possible to maintain. If not, the rope must be replaced.

Rope Replacement

When rope replacement is necessary, ALL suspension ropes must be replaced. Replacing a single rope is only allowed if a rope is damaged during initial installation. When re-roping a car:

- Rope shall be as specified by the original elevator manufacturer or at least equivalent in strength, weight, and design.
- Ropes must be new, all from the same manufacturer, and of the same material, grade, construction, and diameter.
- Proper data tags shall be applied.

Ropes Used on MCE Elevators

- The 470 Series machine utilizes a 10mm rope over a 15.75" sheave
- The 520 Series machine utilizes a ½" rope over a 20" sheave
- The 800 Series machine utilizes a 5/8" rope over a 25" sheave
- The governor utilizes a 3/8" rope over a 12" sheave

Rope Shortening

MCE provides extensions on the bottom of the elevator counterweight that may be removed to compensate for rope stretch after initial installation. Before removing an adjustment block, be certain that it will not cause minimum or maximum runbys to be violated.

Rope Fastenings

The most common end termination method in hoist rope installation uses a wedge socket. This method utilizes a specially constructed socket in which a rope is looped inside and then is secured with the appropriate wedge. When used in tandem both components complete a unique internal configuration that becomes tight when a load is applied to the finished connection. Care must be taken to ensure that the wedge is not reversed in the socket. This could lead to reduced attachment efficiency or breakage. When performed properly installation and shortening can be performed quickly and efficiently.

Each Brugg wedge socket consists of the socket, rod, wedge, 2 nuts, 1 washer, 1 cotter pin and 2 retaining clips. Brugg Wire Rope wedge sockets are tested with 8 x19 extra high-traction steel wire rope and exceed ASME A17.1 Rule 2.20.9 and all other applicable safety codes.

Specifications

- Socket: Cast steel ASTM-A27
- Grade: 60-30 stress relieved
- Rod: Rolled or forged steel ASTM 668
- Wedge: Cast steel ASTM-A27, Grade 60-30
- Standard Finish: Galvanized

Runby and Clearances

- After replacing, shortening, or tensioning ropes, check all roping clearances against data plates and original installation drawings. Refer to the manual for the controller (Motion 4000 or iControl) and run those tests that assure the sheave will break traction when car or counterweight is on its associated buffer.

Rope Application

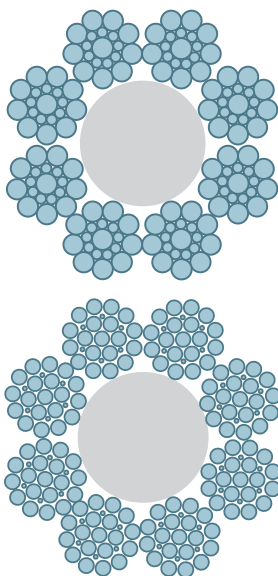


HOIST ROPE QUICK REFERENCE GUIDE

GUÍA DE REFERENCIA DE CABLE DE IZAR

BRUGG: 8 X19 CLASS*
 BRUGG: TIPO 8 X19*

* CLASS INCLUDES 8 X 25
 * INCLUYE EL 8 X 25

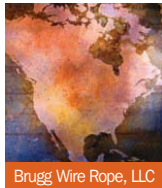


Diameter Diámetro	Nominal Strength Resistencia Nominal <i>Traction/Tracción · EHS</i>	Rope Weight Peso del cable
1/4 in (6.3 mm)	3600 lbs · 4500 lbs	0.09 lbs/ft (0.13 kg/m)
5/16 in (8.0 mm)	5600 lbs · 6900 lbs	0.15 lbs/ft (0.22 kg/m)
3/8 in (9.5 mm)	8200 lbs · 9900 lbs	0.20 lbs/ft (0.30 kg/m)
10.0 mm	10000 lbs · 12000 lbs	0.23 lbs/ft (0.34 kg/m)
7/16 in (11.0 mm)	11000 lbs · 13500 lbs	0.28 lbs/ft (0.42 kg/m)
12.0 mm	14000 lbs · 17000 lbs	0.34 lbs/ft (0.50 kg/m)
1/2 in (12.7 mm)	14500 lbs · 17500 lbs	0.39 lbs/ft (0.58 kg/m)
9/16 (14.3 mm)	18500 lbs · 22100 lbs	0.46 lbs/ft (0.68 kg/m)
5/8 in (16.0 mm)	23000 lbs · 27200 lbs	0.59 lbs/ft (0.87 kg/m)
11/16 in (17.5 mm)	27000 lbs · 32800 lbs	0.69 lbs/ft (1.03 kg/m)
3/4 in (19.0 mm)	32000 lbs · 38900 lbs	0.82 lbs/ft (1.22 kg/m)
13/16 in (20.6 mm)	37000 lbs · 46000 lbs	0.96 lbs/ft (1.43 kg/m)
7/8 in (22.2 mm)	42000 lbs · 52600 lbs	1.11 lbs/ft (1.65 kg/m)
15/16 in (23.8 mm)	48000 lbs · 60000 lbs	1.27 lbs/ft (1.89 kg/m)
1 in (25.4 mm)	54000 lbs · 68400 lbs	1.45 lbs/ft (2.16 kg/m)

Available in 1370/1770 N/mm² (dual tensile), 1570 N/mm² or 1770 N/mm². Other diameters available on request. Some sizes also available in iron grade or galvanized wires. For further information contact your Sales or Engineering Department representative.

Disponible en 1370/1770 N/mm² (tensión dual), 1570 N/mm² o 1770 N/mm². Otros diámetros son disponibles por encargo. Algunos tamaños también son disponibles en una categoría de hierro o alambres galvanizados. Para más información favor de comunicarse con su representante de nuestro departamento de ventas o ingeniería.

- Governor Rope: 3/8 in (9.5 mm)
- Hoist Machine/Rope: 478|10.0 mm, 525|1/2 in (12.7 mm), 808|5/8 in (16.0 mm)



BRUGG

ASME RULES & GUIDELINES

The American Society of Mechanical Engineers is one of the most highly respected organizations of engineers in the world. Focused on keeping mechanical engineers current in the latest technical, educational and research issues in various fields of engineering (including the elevator industry), the ASME sets internationally recognized industrial and manufacturing codes and standards to enhance public safety.

As part of Brugg Wire Rope's continuing efforts towards increasing the industry's level of knowledge and awareness in proper technique and procedure, we offer a summation of relevant guidelines and changes to previous ASME materials (ASME A17.1-2004 and CSA B44-04) detailing areas we deem vital. This is offered as a courtesy to all professionals but should not be construed as a substitute for consulting a full edition of ASME A17.1-2007/CSA B44-07, which contains full requirements for: elevators, escalators, dumbwaiters, moving walks, material lifts and dumbwaiters with automatic transfer devices. *(The materials quoted herein will remain current, with occasional addenda, until 2010.)*

As most are aware, ASME guidelines are typically packed with minute detail making them at times tedious to read and hard for even the most experienced professional to follow readily. In order to make it easier for users to locate relevant topics each section offers brief summations of ASME materials providing a useful overview of each section. It is our hope that the information provided will be of interest and prove useful to you in your efforts.

ONLY ROPES CLASSIFIED AS ELEVATOR ROPES SHALL BE USED IN INSTALLATIONS AND UPON THEIR REPLACEMENT SHOULD NEVER BE REUSED.

ASME A17.1-2007/CSA B44-07 Part 2: Electric Elevators

Section 2.20 Suspension Ropes and their Connections.

2.20.1 Suspension Means

Elevator cars shall be suspended by steel wire ropes attached to the car frame or passing around sheaves attached to the car frame specified in 2.15.1. Ropes that have been previously installed and used on another installation shall not be reused. Only iron (low-carbon steel) or steel wire

ropes, having the commercial classification "Elevator Wire Rope," or wire rope specifically constructed for elevator use, shall be used for the suspension of elevator cars and for the suspension of counterweights. The wire material for ropes shall be manufactured by open-hearth or electric furnace process or their equivalent.

ALL RELEVANT ROPE DETAILS SHOULD BE RECORDED ON A ROPE DATA TAG UPON INITIAL INSTALLATION AND WITH EACH ROPE REPLACEMENT THEREAFTER.

2.20.2 Wire Rope Data

2.20.2.2 On Rope Data Tag.

A metal data tag shall be securely attached to one of the wire rope fastenings. This data tag shall bear the following wire rope data:

- (a) the diameter in millimeters (mm) or inches (in.)
- (b) the manufacturer's rated breaking strength
- (c) the grade of material used
- (d) the month and year the ropes were installed
- (e) the month and year the ropes were first shortened
- (f) whether the ropes were nonpreformed or preformed
- (g) construction classification
- (h) name of the person or organization who installed the ropes
- (i) name or trademark of the manufacturer of the ropes
- (j) lubrication information

A new tag shall be installed at each rope renewal. The material and marking of the rope data tag shall conform to 2.16.3.3, except that the height of the letters and figures shall be not less than 1.5 mm (0.06 in.).

CAREFUL ATTENTION MUST BE PAID DURING SOCKETING TO AVOID TWISTING, UNTWISTING OR KINKING WIRE ROPES.

Section 2.20.9.7.1 Handling

The Rope to be socketed shall be carefully handled to prevent twisting, untwisting or kinking.

PRIOR TO SOCKETING, NONPREFORMED ROPES MUST BE SEIZED THREE TIMES ON EACH SIDE OF THE CUT WHILE PREFORMED ROPES SHALL BE SEIZED A MINIMUM OF AT LEAST ONCE ON EITHER SIDE OF THE CUT.

2.20.9.7.2 Seizing of Rope Ends

The rope ends to be socketed shall be seized before cutting with seizing in accordance with the following:

(a) The seizing shall be done with annealed iron wire, provided that other methods of seizing be permitted, that give the same protection from loss of rope lay. Where iron wire is used for seizing, the length of each seizing shall not be less than the diameter of the rope.

(b) For nonpreformed rope, the seizings shall be made at each side of the cut end of the rope, and the second seizing shall be placed back from the first the length of the end to be turned in. The third seizing shall be at a distance from the second equal to the length of the tapered portion of the socket.

(c) For preformed rope one seizing shall be made at each side of the cut in the rope. The seizing shall be at a distance from the end of the rope equal to the length of the tapered portion of the socket plus the length of the portion of the rope to be turned in.

A WRITTEN MAINTENANCE CONTROL PROGRAM MUST BE ESTABLISHED AND RIGIDLY FOLLOWED TO INSURE THAT ALL INSTALLATION EQUIPMENT REMAINS IN COMPLIANCE.

Section 8.6 Maintenance, Repair, and Replacement

8.6.1.2 General Maintenance Requirements

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8.6.1.2.1

A written Maintenance Control Program shall be in place to maintain the equipment in compliance with the requirements of 8.6.

(a) The Maintenance Control Program shall consist of but not be limited to

(1) examinations, maintenance, and tests of equipment at scheduled intervals in order to ensure that the installation conforms to the requirements of 8.6. The maintenance procedures and intervals shall be based on

(a) equipment age, condition, and accumulated wear

(b) design and inherent quality of the equipment

(c) usage

(d) environmental conditions

(e) improved technology

(f) the manufacturer's recommendations for any SIL rated devices or circuits

(2) cleaning, lubricating and adjusting applicable components at regular intervals and repairing or replacing all worn or defective components where necessary to maintain the installation in compliance with the requirements of 8.6.

(b) The instructions for locating the Maintenance Control Program shall be provided in or on the controller along with instructions on how to report any corrective action that might be necessary to the responsible party.

(c) The maintenance records shall be required by 8.6.1.4 shall be kept at a central location.

(d) The Maintenance Control Program shall be accessible to the elevator personnel and shall document compliance with 8.6.

(e) Procedures for tests, periodic inspections, maintenance, replacements, adjustments, and repairs for all SIL rated E/E/PES electrical protective devices and circuits shall be incorporated into and made part of the Maintenance Control Program. See 2.26.4.3.2, 2.26.9.4 (b), 2.26.9.5.1 (b), and 2.26.9.6.1 (b).

(f) Where unique or product-specific procedures or methods are required to inspect or test equipment, such procedures or methods shall be included in the Maintenance Control Program.

WHENEVER A DEFECTIVE PART AFFECTING AN OPERATION'S SAFETY IS IDENTIFIED, SUCH EQUIPMENT MUST BE TAKEN OUT OF SERVICE UNTIL ALL REPAIRS HAVE BEEN COMPLETED.

8.6.1.2.2

Where a defective part directly affecting the safety of the operation is identified, the equipment shall be taken out of service until the defective part has been adjusted, repaired or replaced.

SPlicing IS NEVER AN ACCEPTABLE ALTERNATIVE FOR LENGTHENING OR REPAIRING SUSPENSION, GOVERNOR AND COMPENSATION ROPES.

8.6.2.5 Repair of Ropes.

Suspension, governor, and compensating ropes shall not be lengthened or repaired by splicing (see 8.7.2.21).

IF A PART FEATURES REDUCED STRENGTH, OR OFFERS DESIGN CHARACTERISTICS NOT EQUAL TO THE ORIGINAL TO BE REPLACED, IT IS NOT TO BE USED.

8.6.3 Replacements

8.6.3.1 Replacement Parts.

Replacements shall be made with parts of at least equivalent material strength and design.

EXCEPT IN AN INSTANCE WHERE A ROPE REVEALS DAMAGE PRIOR TO FINAL ACCEPTANCE TESTING— IF ONE ROPE FROM A SET EXHIBITS SIGNS OF WEAR OR DAMAGE, THE ENTIRE SET MUST BE REPLACED.

8.6.3.2

Replacement of a Single Suspension Rope.

If one rope of a set is worn or damaged and requires replacement, the entire set of ropes shall

be replaced, except, where one rope is damaged during installation or acceptance testing prior to be subjected to elevator service, it shall be permissible to replace a single damaged rope with a new one, provided that the requirements of 8.6.3.2.1 through 8.6.3.2.6 are met.

WHEN YOU REPLACE A HOIST ROPE RECORD ALL VITAL DATA UPON THE DATA TAG.

8.6.3.2.1

The wire rope data for the replacement rope must correspond to the wire rope data specified in 2.20.2.2 (a), (b), (c), (f), and (g) for the other ropes.

DATA TAGS FOR REPLACEMENT ROPES SHALL BE AFFIXED TO THOSE REPLACEMENT ROPES

8.6.3.2.2

The replacement rope shall be provided with a wire rope data tag conforming to 2.20.2.2.

IT IS NEVER ACCEPTABLE TO REPLACE A SINGLE DAMAGED ROPE WITH A NEW ONE IF THAT SET OF ROPES HAS ALREADY BEEN SHORTENED SINCE ITS ORIGINAL INSTALLATION.

8.6.3.2.3

The suspension ropes, including the damaged rope, shall not have been shortened since their original installation.

YOU MAY NOT REPLACE A SINGLE DAMAGED ROPE WITH A NEW ONE IF ANY OF THE REMAINING ROPES MEASURE LESS THAN THE NOMINAL DIAMETER MINUS 0.4 MM (0.014 IN.).

8.6.3.2.4

The diameter of any of the remaining ropes shall not be less than the nominal diameter minus 0.4 mm (0.015 in.).



TENSIONING MUST BE CHECKED ROUTINELY, IF PROPER EQUALIZATION CANNOT BE MAINTAINED SIX MONTHS AFTER THE INSTALLATION OF A SET OF ROPES, THAT SET MUST BE REPLACED.

8.6.3.2.5

The tension of the new replacement rope shall be checked and adjusted as necessary at semi-monthly intervals over a period of not less than two months after installation. If proper equalization of rope tension cannot be maintained after 6 months, the entire set of hoist ropes shall be replaced.

REPLACEMENT ROPES MUST UTILIZE THE SAME FASTENING AS OTHER ROPES IN THE SET.

8.6.3.2.6

The replacement rope shall be provided with the same type of suspension-rope fastening used with the other ropes.

WHEN REPLACING ROPES OTHER THAN GOVERNOR ROPES, ALL ROPES MUST BE NEW, FROM THE SAME MANUFACTURER, SAME MATERIAL, GRADE CONSTRUCTION AND DIAMETER AS THE ORIGINAL SET— DATA TAGS MUST BE CREATED.

8.6.3.3 Replacement of Ropes Other Than Governor Ropes

8.6.3.3.1

Replacement of all ropes, except governor ropes (see 8.6.3.4) shall conform to the following:

(a) Replacement ropes shall be as specified by the original equipment manufacturer or be at least equivalent in strength, weight, and design.

(b) Ropes that been previously used in another installation shall not be reused.

(c) When replacing suspension, compensating, and card or drum counterweight ropes, all ropes in a set shall be replaced, except as permitted by 8.6.3.2.

(d) The ropes in a set shall be new, all from the same manufacturer, and of the same material, grade construction, and diameter.

(e) Data tags conforming to 2.20.2.2 shall be applied

(f) Suspension, car, and drum counterweight rope fastenings shall conform to 2.20.9.

THE SAME QUALITY GUIDELINES FOLLOWED WHILE REPLACING OTHER ELEVATOR ROPES SHALL BE USED WHEN REPLACING GOVERNOR OR SAFETY ROPES.

8.6.3.4 Replacement of Governor or Safety Rope

8.6.3.4.1

Governor shall be of the same size, material, and construction as the rope specified by the governor manufacturer, except that a rope of the same size but of different material or construction shall be permitted to be installed in conformance with 8.7.2.19.

NEVER REPLACE ONLY ONE BELT OR CHAIN FROM A SET SHOWING SIGNS OF DAMAGE.

8.6.3.5 Belts and Chains

If one belt or chain is stretched beyond that specified by manufacturer's recommendation, or is damaged so as to require replacement, the entire set shall be replaced. Sprockets and toothed sheaves shall also be replaced if worn beyond that specified in the manufacturer's recommendations.

SUSPENSION AND COMPENSATION ROPES SHALL BE KEPT CLEAN, WELL LUBRICATED AND PROPERLY TENSIONED.

8.6.4.1 Suspension and Compensation Wire ropes

8.6.4.1.1

Suspension and compensating ropes shall be kept lubricated and clean so they can be visually inspected.

8.6.4.1.2

Precautions shall be taken in lubricating suspension wire ropes to prevent the loss of traction. Lubrication shall be in accordance with instructions on the rope data tag (see 2.20.2.2 (j)), if provided.

8.6.4.1.3

Equal tension shall be maintained between individual ropes in each set. When suspension rope tension is checked or adjusted, an anti-rotation device conforming to the requirements of 2.20.9.8 shall be permitted.

GOVERNOR ROPES MUST BE KEPT CLEAN .

8.6.4.2 Governor Wire Ropes

8.6.4.2.1

The ropes shall be kept clean

ANY LUBRICANT FOUND ON A GOVERNOR ROPE SHOULD BE REMOVED COMPLETED OR THE GOVERNOR ROPE ITSELF MUST BE REPLACED.

8.6.4.2 Governor Wire Ropes

8.6.4.2.2

Governor ropes shall not be lubricated after installation. If lubricants have been applied to governor ropes, they shall be replaced, or the lubricant removed, and the governor and safety shall be tested as specified in 8.11.2.3.2 (b) and 8.11.2.2.2.

WHEN EXISTING SHEAVES ARE TO BE USED WITH ROPES DIFFERENT FROM THOSE ORIGINALLY SPECIFIED, EITHER THE ORIGINAL ELEVATOR MANUFACTURER OR A LICENSED PROFESSIONAL ENGINEER MUST CERTIFY THAT THOSE SHEAVES WILL BE ABLE TO MEET NEW CONDITIONS.

8.7.2.21 Suspension Ropes and Their Connections

8.7.2.21.1

Change in Ropes.

Where the material grade, number or diameter of ropes is changed, the new ropes and their fastenings shall conform to 2.20. When existing sheaves are retained using ropes different from those originally specified, the original elevator manufacturer or a licensed professional engineer shall certify the sheave material to be satisfactory for the revised application.

IF WIRE BREAKS ARE FOUND IN SUSPENSION AND COMPENSATION ROPES, OR IF ANY OF THE FOLLOWING ROPE REMOVAL CRITERIA DETAILED BELOW ARE ATTAINED, THEY SHOULD BE REPLACED.

(cc) Wire Suspension and Compensating Ropes (Item 3.23).

(1) Wire suspension and compensating ropes shall be replaced

(a) if the broken wires are equally distributed among the strands, when the number of broken wires per rope lay in the worst section of the rope exceeds the values shown in column A of Table 8.11.2.1.3 (cc) (1); or

(b) if the distribution of broken wires is unequal, and broken wires predominated in one or two strands, when the number of broken wires per rope lay in the worst section of the rope exceeds the values shown in column B of Table 8.11.2.1.3 (cc)(1) or

(c) if four or five wires, side by side, are broken across the crown of any strand, when the number of broken wires per rope lay in the worst section of

Table 8.11.2.1.3(cc)(1) Wire Suspension and Compensation Ropes

Types of Wire Rope	A [Note (1)]	B [Note (1)]	C [Note (1)]
6 x 19 class	24-30	8-12	12-20
8 x 19 class	32-40	10-16	16-24

GENERAL NOTE: 6 x 19 class rope has 6 strands with 16 to 26 wires per strand. 8 x 19 class rope has 8 strands with 16 to 26 wires per strand.

NOTE:
(1) The upper limits may be used when inspections are made monthly by a competent person.

rope exceeds values shown in column C of Table 8.11.2.1.3 (cc)(1); or

(d) if in the judgment of the inspector, any unfavorable condition, such as fretting corrosion (red dust or rouge), excessive wear of individual wires in the strands, unequal tension, poor sheave grooves, etc. exists, the criteria for broken wires will be reduced by 50% of the values indicated in Table 8.11.2.1.3 (cc)(1) for any of the three conditions described above; or

(e) if there is more than one valley break per rope lay.

ROPES ON WINDING DRUM MACHINES SHOULD BE REPLACED IF BROKEN WIRES ARE DETECTED OR IF THERE IS MORE THAN ONE VALLEY BREAK PER ROPE LAY

(2) On winding drum machines, the rope shall be replaced

(a) if the broken wires are equally distributed among the strands, when the number of broken wires per rope lay in the worst section of rope exceeds 12 to 18; or

(b) if wire breaks predominate in one or two strands, when the number of broken wires per rope lay in the worst section of rope exceeds 6 to 12; or

(c) if there is more than one valley break per rope lay.

Table 8.11.2.1.3(cc)(3)

Nominal Size in inches (mm)	Maximum Reduced Diameter in inches (mm)
3/8 • (9.5 mm)	11/32 • (8.7 mm)
7/16 • (11.0)	13/32 • (10.3 mm)
1/2 • (12.7 mm)	15/32 • (11.9 mm)
9/16 • (14.3 mm)	17/32 • (13.5 mm)
5/8 • (16.0 mm)	37/64 • (14.7 mm)
11/16 • (17.5 mm)	41/64 • (16.3 mm)
3/4 • (19.0 mm)	45/64 • (17.9 mm)
1 • (25.4 mm)	15/16 • (23.8 mm)

REPLACE COMPENSATION OR GOVERNOR ROPES IF DIAMETERS REGISTER LESS THAN THE NOMINAL VALUES DETAILED IN TABLE 8.12.2.1.3 (CC) 3

(3) On any type of elevator, the suspension compensation and governor ropes shall be replaced when their actual diameter is reduced below the value shown in Table 8.11.2.1.3(cc) 3.

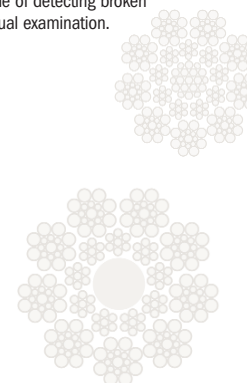
See Table 8.11.2.1.3 (cc) (3)

COATED HOIST ROPES ARE REQUIRED TO BE CHECKED VIA MAGNETIC FLUX TESTING AND THROUGH VISUAL EXAMINATION TO VERIFY THEY ARE FREE FROM THE PRESENCE OF BROKEN WIRES.

8.11.3.4 Periodic Test Requirements: Category 5

8.11.3.4.2

Coated ropes shall be required to have a magnetic flux test capable of detecting broken wires in addition to a visual examination.





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Full payment due within thirty (30) days of invoice date.

Conditions

As stipulated on our acknowledgments and invoices.

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F.O.B. origin.

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All goods offered for sale by Brugg Wire Rope, Inc. LLC(hereinafter Brugg Wire Rope) are offered for sale only on those terms and conditions appearing on Brugg Wire Rope invoice forms. A SUMMARY OF THE MORE IMPORTANT PROVISIONS OF THESE TERMS AND CONDITIONS OF SALE IS REPRODUCED HEREIN.

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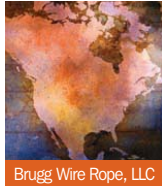
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Orders may be cancelled only with written consent FROM BRUGG WIRE ROPE.

Ordering information

All catalogued items are generally in stock and available for immediate delivery. Call us for the name of your nearest distributor. Brugg Wire Rope reserves the right to improve, enhance, or modify the features and specifications of Brugg Wire Rope products without prior notification.



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For some a wire rope appears to be nothing more than a simple grouping of metal wires twisted into a bundle. This is inaccurate to say the least. Wire rope is not

a static item but must be thought of as a machine with a surprising quantity of moving parts that must work in harmony with each other and the surrounding hoisting system. To better appreciate the complexity of wire rope, the high level of sophistication it requires to produce it, and differences between the various forms we produce, we offer readers this basic glossary of key terms.

Abrasion

Excessive abrasion indicates a disharmony between the rope and surrounding supporting parts. This can lead to costly wear on rope surfaces and on the sheave groove surface. Abrasion is increased due to a host of factors including:

- **unequal tensioning of rope sets (high and low tension ropes will experience higher abrasion)**
- **worn or deformed sheave grooves**
- **rope elongation as it passes through sheaves**
- **excessive torsion of the rope along its axis during service**
- **misaligned sheaves or pulleys during installation**
- **using the incorrect rope**
- **the effects of vibration upon the rope**
- **lack of, or poor lubrication**

Bending Cycles

Elevator rope is made of soft steel and is primarily designed to be flexible. While strong, a hoist rope's wire and strand components must readjust constantly as a rope moves over the sheave, flexes and eventually straightens back. Naturally more bending cycles means more stress, with an increased opportunity for fatigue breaks.

Often a secondary sheave is placed very close to a drive sheave in order to make an elevator design more compact. The use of multiple sheaves places makes the rope work even harder as it has to adjust to additional bend cycles. The lessening of space between the drive sheave and additional sheaves, in tandem with increased bending cycles accelerates the fatigue process.



Brugg i-LINE

During production Brugg ropes are marked across their surface with a painted line called an "i-Line." More than a simple identity mark, it is the only efficient way during installation for professionals to detect and prevent potential rope rotation and twisting. Correctly installed ropes deliver longer product lifetimes, greater safety, comfort and less service downtimes.

Constructional Stretch

Whenever a load is applied to the helically set wires and strands of a wire rope, these elements react in a constrictive manner and compress the core. This brings all the components closer together creating a slight reduction in overall rope diameter and a lengthening of the rope itself.

Ropes with strand or steel wire cores exhibit less constructional stretch than those with fiber cores. Overall steel cores offer superior stretch characteristics in comparison to standard sisal cores.

It is difficult to define a finite value for constructional stretch due to a mix of factors such as: the type of core; rope construction; helix length; grade or grades of steel used and the degree of preforming.

Additional factors like car weight, rope speed, rope configurations, braking and acceleration speeds, shaft height and rope lengths and sheave conditions make it difficult to determine an actual rate of constructional stretch.

Core

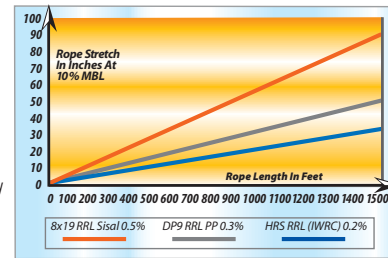
Wire ropes are generally constructed using two types of cores—fiber and steel wire. Historically, standard fiber core ropes have been made using sisal yarn, which is a natural fiber. Today however the industry is moving towards the use of synthetic fiber core ropes. These materials offer the advantage of being more precise in diameter, form-stable and are more resistant to the effects of humid environments.

Elastic Stretch

Elastic stretch results from the recoverable elongation of the steel strands and wires in a hoist rope. Elastic properties for wire ropes are well documented and allow precise calculations to be made in determining elastic stretch characteristics.

GLOSSARY OF TERMS

Hoist Rope Stretch In Inches Based On Rope Length In Feet



For a more detailed analysis of Rope Stretch contact Brugg Wire Rope.

Elongation

During usage all wire ropes will naturally stretch to some degree. However special attention must be made paid to be sure that the amount of elongation stays within a predetermined acceptable range. Generally a fiber core rope will stretch more than ropes using steel, mixed or synthetic cores.

Constructional stretch (permanent stretch) develops over time with the greatest amount occurring during the initial weeks and months of operation. **(Brugg assumes that hoist ropes are to be used under "normal" conditions, with loads not exceeding 10% of the Minimum Breaking Load or MBL.)** A wide range of factors affect constructional stretch such as, the design of the installation, hoist rope length, acceleration and deceleration of the elevator, types of groove profiles, actual load range in reference to the MBL, the twisting of ropes during installation and tensioning. In some installations a major amount of the rope stretch may occur within a few days or even a week after installation.

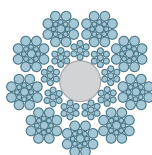
Fatigue

When individual hoist rope wires lose their ability to bend the result is rope fatigue and wire breaks. This is caused by some sort of constraint that prevents the wires from moving freely and working in harmony with each other. Often it is an indication of either high rope bending stresses or excessive stress placed upon loaded rope wires while they bend over a sheave. All ropes are subject to fatigue and abrasion. Nicking and other forms of damage such as kinking can accelerate this condition. Use of undersized sheaves, improper sheave maintenance, aggressive groove types, multiple sheave configurations, reverse bends, and poor lubrication or improper rope tensioning technique adversely affects bending stresses leading to faster rope fatigue. Combinations of these factors will have a multiplicative effect negatively impacting on fatigue performance.



GLOSSARY OF TERMS

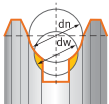
Filler Wire Construction



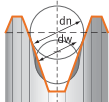
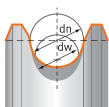
A wire construction is designed to offer better resistance to bending fatigue. We recommend that filler wire constructions be favored when a task requires the use of ropes of 6 to 9 outer strands, with diameters larger than 5/8 in. (16 mm),

because of filler wire's inherent advantages in flexibility. However a disadvantage of this strand construction is in its vulnerability to geometry distortion—especially when the filler wire itself is not of nominal diameter.

Groove Geometries

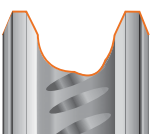


A rope's diameter must fit a sheave's groove radius correctly. If the grooves in the drive sheave (aka "friction" or "traction" sheave) are too large the rope will slip and this will result in groove damage. However should the grooves in a sheave be too narrow the rope will be exposed to higher lateral pressures, which in turn leads to rope fatigue and failure. In either case, shortened service life can result in costly downtime, repair or total sheave replacement.



Brugg recommends the close inspection of hardened sheaves and their replacement or reconditioning should they deviate from nominal dimensions. In addition, Brugg recommends the total replacement of all unhardened sheaves and full sets of ropes during maintenance.

Replacement ropes are always larger in diameter than used ropes (possessing an upper tolerance range) and consequently cannot settle into the existing deeper or narrower traction sheave groups created by the constant friction between the sheave and the previous rope

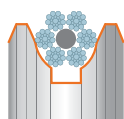


set. The larger diameter of a replacement rope can lead to unequal tensioning of all the ropes, resulting in an individual new rope carrying more weight while others carry less. Such an imbalance can create rope sets that travel unequal distances at a constant speed, which can lead to severe sheave wear.

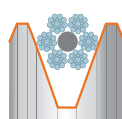
Careful sheave inspection reveals that over time grooves become slightly deeper and narrower as they adapt to the abrasive force exerted by hoist ropes. Consequently it's easy to understand why the replacement of a single rope is rarely

adequate and can lead to greater problems later.

Always inspect the groove radius at friction and deflection sheaves and, if necessary, re-cut them. Significant damage can also be created by irregular groove wear, especially in double wrap drives. In such installations the ropes themselves are frequently exposed to higher tensions which can reduce rope life considerably. It is critical that groove shapes be checked (radius gauge, etc.) if new ropes are to be used with previously used traction sheaves.



Undercut
U-Groove



Undercut
V-Groove

Groove Types: Undercut U and V-Grooves

To compensate for the loss of surface contact (traction) due to the use of smaller diameter sheaves, groove types such as the Undercut "U" and "V" Groove designs were created. Where once contact points were spread across a large arc of the sheave and rope, modern groove profiles reduce the groove surface the rope contacts. This creates greater groove pressures and can accelerate wire wear, abrasion and lead to fatigue breakage.

Lay Direction

Brugg recommends that only in the most special cases (unguided or in wire guided counterweight elevators) should one ever consider using both right and left hand lay ropes in tandem. Lay direction can have a minimal impact on rope torque and on how it effects the guiding forces of standard elevator with guide rails. For better efficiency and to reduce the possibility of unequal wear on ropes, Brugg recommends using rope sets from only one manufacturer.

Lubrication



Brugg Wire Ropes are lubricated during production to help prevent corrosion and abrasion. Rope elements are designed to flex or bend during use and this movement creates an enormous amount of internal friction. To combat friction's effects, lubrication is applied upon stranding (the point where all the wires are joined together) insuring that each wire has a surface bearing a fine film of protective lubricant. Brugg then removes the excess lubricant from the surface of the finished strand. Good lubrication can almost double a rope's service life. As part of maintenance, lubricant must be

reapplied to counter dirt build-up, abrasion and the natural depletion of lubricant that occurs during use.

Preforming

Preforming is part of the manufacturing process that gives wire rope its characteristic helical form and occurs prior to final closure. The process reduces internal torsional stresses and increases the fatigue resistance of wires, creating a more stable and better balanced rope. Most elevator ropes are preformed.

Preforming creates ropes that run over drums and sheaves more efficiently thus making them easier to handle and more efficient to install. However preforming itself does not eliminate the absolute necessity for a professional to seize (and in some cases triple seize) a rope prior to cutting.

Prestretching

A hoist rope may require a number of adjustments in its lifetime due to the effects of constructional stretch. Some believe that prestretching ropes during manufacture can reduce the frequency of number shortenings (meaning less maintenance) and offers certain handling advantages where the pit clearance is shallow and the overhead run-by is limited. However prestretching, no matter how carefully administered, can lead to a vital sacrifice in rope diameter. In some cases this can even mean that a rope bears a diameter that measures only nominal before it has been applied to a machine.

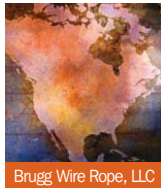
Brugg manufactures non-prestretched ropes bearing a pre-engineered amount of stretch ranging from 6-8 in. (152.4 mm-203.2 mm), offering the perceived advantages of prestretched ropes without their potential shortcomings.

Rope Tensioning



Immediately upon initial installation, and approximately three months after, Brugg recommends checking rope tensioning with a suitable device. Simply setting the rope tension and adjusting the spring or buffer tension by hand is insufficient as the manufacturer tolerances on springs and buffers are not precisely controlled.

For this Brugg has developed RPM (Rope Performance Measurement), an economical, precise and easy to use device offering professionals the advantages of precise tensioning.



BRUGG

GLOSSARY OF TERMS

Rouging

Rouging is when a fine, red iron oxide crust or powder (rouge) forms on a hoist rope giving it a "rusty" appearance. Rouging is due to unique type of abrasion called "fretting". This occurs when surfaces bearing heavy loads rub against each other while being subjected to repetitive levels of small amplitude vibrations. These low amplitude vibrations are due to the load vibrations that occur during the normal loading/ unloading and stop/start of an elevator.

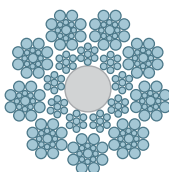
Heavy loads and vibrations can create pressures resulting in the working out of the vital lubrication within a rope. Dry ropes create conditions for increased rope surface abrasion, as evidenced by the metal particles that spontaneously oxidize in the air and appear as a red powder.

Rouging is somewhat different from "rust". Normally "rusting" is evidence of moisture being introduced onto a metal surface. Rouging does not indicate this condition. Rouging is a sign that abrasion is occurring where the rope strands contact the core, or between adjacent strands. Only the flaking metal fragments that are being deposited are actually rusting—the rope itself isn't.

Field lubrication during installation and maintenance is critical to preventing rouging. A failure to maintain proper lubrication can lead to a rope core drying up and failing to provide the necessary amount of support to the rope strands. Rouging can also indicate that a solvent or a lubricant applied to the rope is insufficient to the task and has diluted the existing lubricant and dried out the core and wires within the strands.

It is important to note that field lubrication does not counteract the effects of rouging and cannot restore ropes to their proper operating condition. Rouging is a sign of internal rope degradation and the application of lubrication can only clean and retard further damage.

Seale Construction



The most prevalent strand design in the entire elevator industry is Seale Construction. Due to a combination of design, machinery, maintenance, installation and environmental factors, wire ropes are abraded over time. The big outer wires in Seale Construction offer a large metallic surface that permits a large amount of abrasion before wire failure.

Seizing

"Seizing" is the technical term for the process of securing a wire rope prior to cutting. Secure seizure prevents movement of the individual strands and lay lengths during cutting and preserves a rope's overall structural integrity.

Improperly or loosely seized ends can become distorted or flattened, leading to open strands and core slippage. Improper seizing creates poor load distribution conditions in the strands which can seriously shorten a rope's life span.

Prior to cutting, tightly double seize (**Use Triple seizing with parallel design ropes such as DP9 or HRS**) on either side where the cut is to be made. It is suggested that the length of each seizing should be, at a minimum, equal to the rope's diameter, with each seizing spaced approximately six rope diameters apart.

For ease of use and efficiency we recommend using a glass fiber reinforced self-adhesive tape rather than a soft or annealed wire to seize ends (though this permissible as well). **ELECTRICAL OR DUCT TAPE FOR SEIZING ENDS IS NOT ACCEPTABLE.** While fusing ends is an additional option with steel core ropes after double seizing and cutting, it is clearly unacceptable for sisal core or man-made fiber core ropes due to the destructive nature of high heat upon the fibers.

Sheave Composition And Wire Hardness

Friction sheaves are normally made of GG25 to GG30 cast iron with various alloying additions. Rarely they are offered in GGG 50-60 modular cast iron. Generally the hardness of a sheave is between 200 and 270 HB (Brinell Hardness). Such hardness is required to ensure both sufficient service life and dimensional stability of the rope grooves in heavy-duty friction sheaves. Deflection pulleys

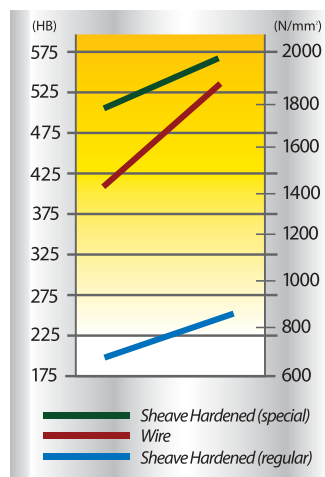


Table shows relationship between Brinell Hardness of sheaves and tensile strength of wire

should also have a hardness of at least of 210 HB.

The hardness of a wire used should reasonably correlate with the hardness of the sheaves at an installation.

However, one must bear in mind that rope hardness is only a small factor that affects sheave wear. Other factors such as the rope's elongation behavior, construction, the geometrics of an installation (groove type), proximity of the sheave to the rope itself, rope lubrication and maintenance regularity and technique, all offer as great an impact (and some would argue greater) on rope or sheave longevity.

Standard Closing, Point Contact rope constructions versus Parallel Closing, Line Contact designs

Brugg has chosen to produce rope utilizing Parallel Closing, Line Contact design constructions in addition to the Standard Closing, Point Contact designs offered by other manufacturers. Parallel Closing designs offer users a multitude of solid performance benefits over Point Contact designs whenever high bend cycles are required, including lower local pressures, better load distributions, higher flexibility characteristics, minimal stretch and rope diameter reduction and improved travel comfort due to higher filling pressures. In addition this type of construction also minimizes permanent (remaining) elongation of the hoist ropes.

Point Contact designs are relatively less sensitive to routine installation techniques than Parallel designs. Point Contact ropes are better able to handle the intense pressures present in installations utilizing multiple deflection sheave placements or in high rise and medium rise elevators where close sheave placements are planned. For further details see our TechTalk article titled, "PARALLEL CLOSING VS. STANDARD".

Strand



A strand consists of one or more layers of wire closed in a helical pattern surrounding an interior central component.

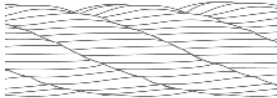
Type of Lay

Brugg Wire produces both Regular Lay (right hand) ropes and Lang Lay (right hand) rope to fit individual client traction needs. The term Regular Lay design means that the actual wires found in a particular rope are arranged to run in the same direction (parallel) that the rope actually lays (or runs). Lang Lay wires cross a rope's center axis at an angle and the strands appear to spiral diagonally around the rope.

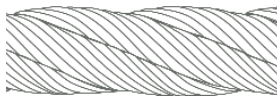
Normally ordinary lay ropes are simpler to mount and have less of a tendency to untwist when standing free in a shaft, while Lang lay ropes exhibit a tendency to provide



GLOSSARY OF TERMS



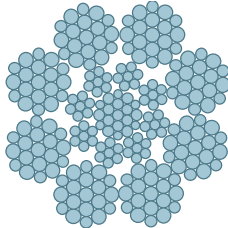
Regular Lay



Lang Lay

better grip on nonmetallic drive sheaves (a higher friction factor). However Lang Lay offers certain negatives which must be considered in traction drive elevators featuring V-and undercut U-grooves such as: a vulnerability to less than careful mounting technique; increased elongation; and reduced ability to handle deflection angles.

Warrington Construction

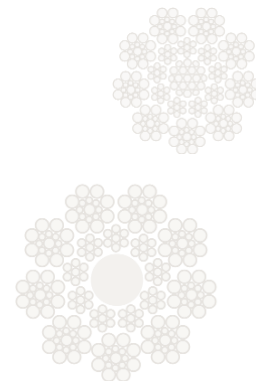


Warrington Constructions use fewer wires compared to filler hoist rope designs and exhibit an increased capacity to be able to deal with the damaging effects of abrasion and fatigue bending.

Wire



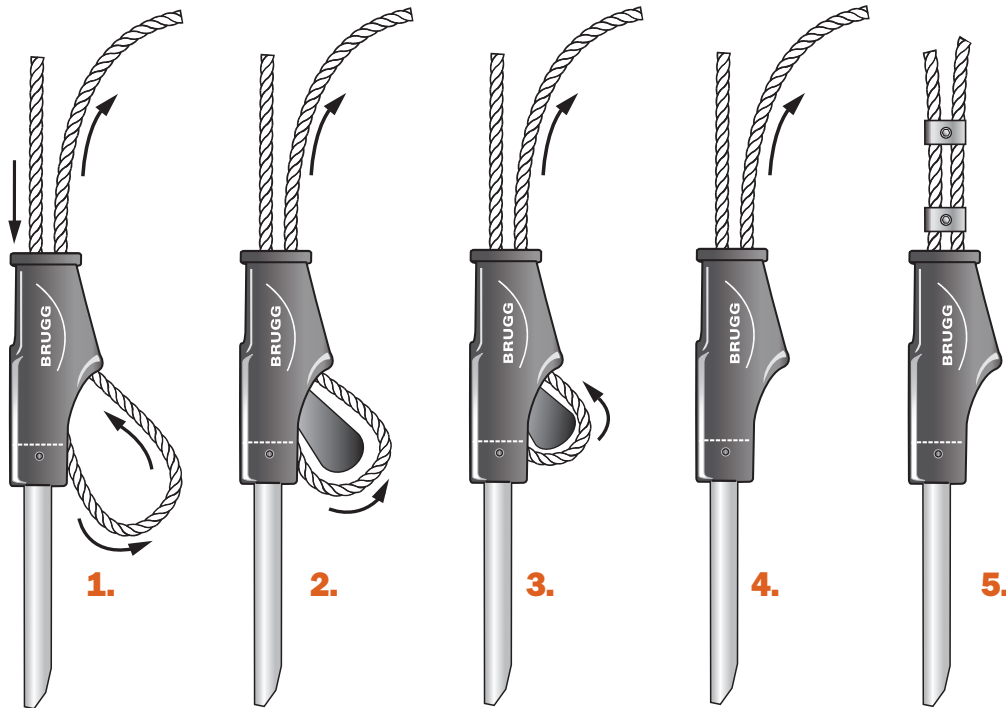
A single metal element twisted into a strand with other wires creating the basic building block for all hoist ropes.





TECH TIPS: WEDGE SOCKET TERMINATIONS

CONSEJOS: TERMINACIONES DE GRILLETE DE CASQUILLOS ACUÑADOS



STEP 1

Insert the rope into the socket.

Insert the end of the wire rope down through the wedge socket body. Be sure to take up slack in the rope. Then thread the end of the rope back up the front side of the wedge socket body, leaving a minimal amount of loop to install the wedge insert. Be sure that the rope is placed correctly into the body of the socket as shown in the diagram or it will not align correctly.

STEP 2

Install the wedge insert.

Place the wedge into the loop. Wedge inserts come marked and color coded so only the correct size can be used for the desired rope diameter (i.e. 3/8 in. wedge insert for a 3/8 in. rope).

STEP 3

Pull on the loose rope.

Pull down on the hoist rope with one hand

to maintain tautness and pull up on the loose end quickly. The loop will gradually tighten drawing the wedge within.

STEP 4

Firmly seat the wedge within.

The wedge will firmly nestle within the socket body. Now let the weight of the car and counterweight rest on the ropes themselves. The rope and wedge insert should rise about 1 in. (2.54 mm) to the final "set" under load when properly seated. Cut surplus amounts of rope but retain approximately 6 in. (15.24 cm) of rope to create a tail section.

STEP 5

Install retaining clips.

Attach a minimum of two retaining clips to fasten the dead end (extra rope emerging from the socket body) to the load bearing end of the rope. Place the first clip a maximum of four times the rope's diameter above the socket and another within eight times the rope's diameter above the first clip. Clips are used to

retain the wedge and prevent rope slippage should the load be removed. Slack in a rope may be adjusted by tapping the wedge with a hammer. Insert a drift pin into the top of the socket body between the rope's load bearing and dead ends and tap the wedge until the rope slides. Re-tighten the wedge. Repeat this procedure until all ropes have equal tension. Tie down all rope sockets upon completion to prevent possible rotation.

Note:

- Retaining wire rope clips are only used to hold the dead end of the wire rope in place. They bear no load.
- When installing retaining clips DO NOT APPLY more than 8 ft.lbs. (of torque) on the bolt and nut. More pressure can deform the clip assembly and shear the bolt, deform the rope or raise a strand.
- It may be necessary to loosen and readjust the retaining clips after a load has been placed on a wedge socket since movement of the wire rope under tension/load can misalign the clips.

THE BRUGG i-LINE INSTALLATION LINE



Correctly installed ropes deliver longer product lifetimes, greater safety, comfort and shorter downtimes for service. All elevator ropes regardless of construction or manufacturer are susceptible to uncontrolled twisting during the installation process.

To guard against this, Brugg offers Brugg i-LINE— a unique feature applied to our elevator ropes during manufacture permitting easy detection of twisted ropes.

At installation, note the i-LINE during a complete run and then count the number of complete turns of the i-LINE about the axis of the rope. **A maximum of 2-3 rotations is acceptable in 30m or 100 ft. of travel distance on Brugg 8x19 Sisal Core Ropes, while a maximum of only one rotation is acceptable with Brugg DP9 or HRS ropes. This applies to 1:1 installations with the amount being doubled for 2:1 installations. A correction is recommended if the number of rotations exceeds this guideline. Turn the end fittings on top of the car (1:1) in the appropriate direction to remove twisting. Usually this is in the direction that is closing the rope.**

If a large twist in the rope is found after corrections review your equipment geometry, traction sheave and pulley alignments.

NOTE: All ropes should be secured to prevent untwisting both during and following installation.

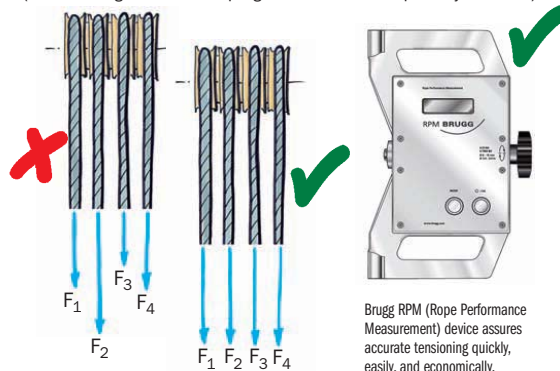


INSTALLATION

We recommend the use of appropriate and well maintained Rope Pulling Grips to prevent build-up or the transfer of rope torque. Additional methods including the use of Reeving Splices are also permissible. **Use Double Seizing on each end when installing new ropes or when shortening them. Use Triple seizing with parallel design ropes such as Brugg DP9 or Brugg HRS. (shown in photo at far left).**

ROPE TENSION

Immediately after initial installation and approximately 3 months following, we recommend checking rope tension with a suitable device. Simply setting the rope tension by adjusting the spring or buffer tension is NOT SUFFICIENT (manufacturing tolerances on springs and buffers are not precisely controlled).



Brugg RPM (Rope Performance Measurement) device assures accurate tensioning quickly, easily, and economically.

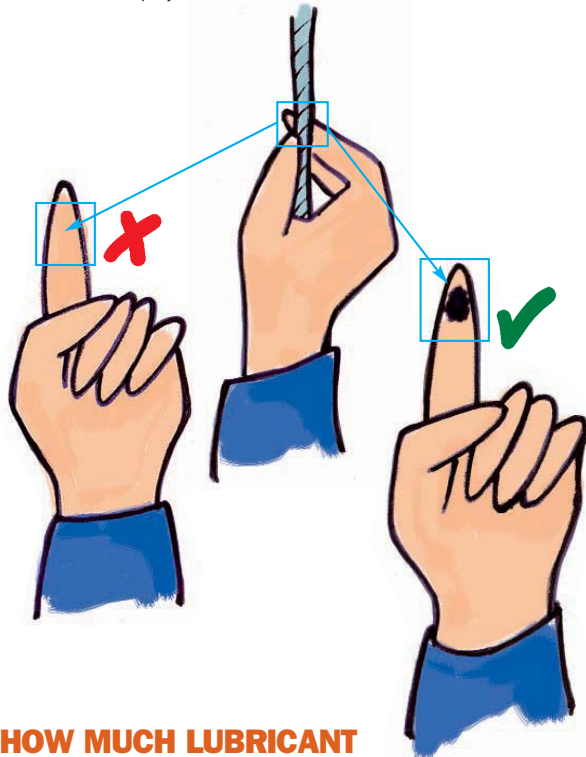
LUBRICATION OF THE ROPES

All Brugg Wire Rope elevator ropes are lubricated during their manufacture. Nevertheless, all elevator ropes must be checked for sufficient lubricant immediately after their installation and be relubricated as needed. Ropes should never be operated if they are not lubricated.

Use only the proper quantity of lubricant sufficient for the job. Lubricants should not drip from the rope during the operation of the elevator. We recommend the use of the Brugg special lubricant or an equivalent lubricant. Regular rope lubrication has positive effects on overall service lifetimes.

WHEN IS LUBRICATION NECESSARY?

Lubrication is suggested if rope appears dry. We recommend that ropes be lubricated once per year at a minimum.



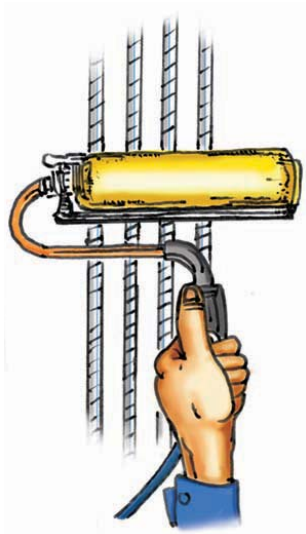
HOW MUCH LUBRICANT IS REQUIRED?

For rope diameters of 0.39 to about 1 inch, apply 0.35 pt (about >0.2 liters) of lubricant per 328 ft (100 meters) of rope length is recommended.

LUBRICATION GUIDELINES

Ropes should be lubricated routinely with even application over the entire surface of the rope. Lubrication outdoors must only be carried out in dry weather. It is essential that the rope is "clean" prior to lubrication.

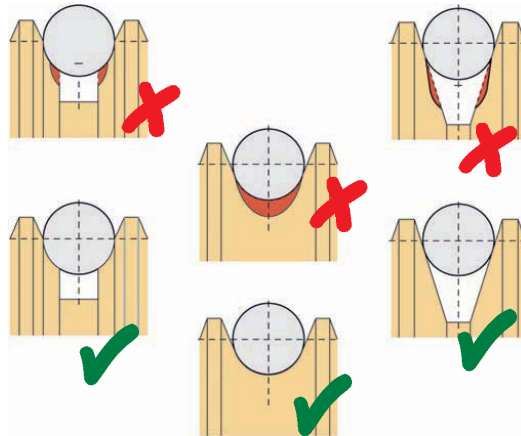
We recommend that ropes be lubricated once per year at a minimum or once every 250,000 cycles (starts/trips).



Brugg VT Lubricant is a blue-green, light-bodied oil that has been specially designed for use as a field dressing on elevator ropes and has been formulated with high quality paraffinic oil fortified with additives to provide good oxidation and corrosion protection. It offers excellent stability and anti-wear capabilities and superior penetration and moisture displacement properties. VT Lube contains no solvents and has a high flash point.

Brugg recommends a lubricant for elevator ropes with an ISO grade of 10, a Viscosity Index (ASTM D-2270) of no lower than 80, with a Viscosity @104°/40°C CST/SUS (ASTM D445/D2270) of 10/59.

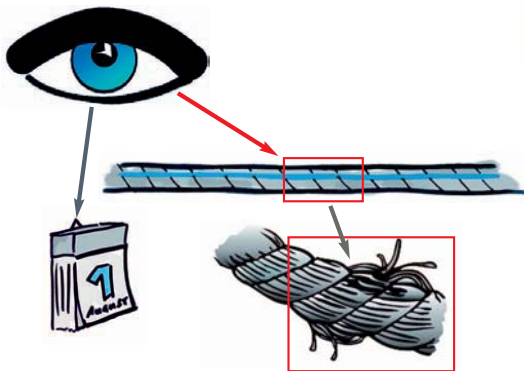
GROOVE GEOMETRY



LUBRICATION CHARACTERISTICS

New lubricants should be compatible with the original lubricant (homogeneous solution). It should have a good penetration capability, a coefficient of friction of μ 0.09 (-) (material pair steel/cast iron) and it must have a very good adhesion.

ROPE INSPECTION

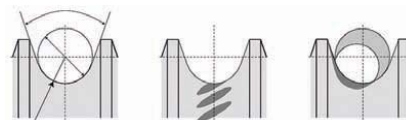


Elevator ropes are not durable machine components. They must be regularly inspected by qualified personnel. Inspection intervals should be scheduled so that potential damage can be detected in time.

The determination of the time when the rope is to be discarded and the monitoring of rope installations is made in accordance with DIN 15020, sheet 2- and ASME A17.1 table 10001.2 (2) (29)(a)—A17.2.1. table 3.29.1 (a).

Depending on the type and number of wire breaks, the number of bearing wires in the outer strands is critical in determining rope discard times.

We recommend that regular inspections be scheduled and recorded and that attachments are also inspected.



The correct geometric shape of the traction sheave grooves is an important factor for the service lifetime of a rope. While the rope is in contact with the traction sheave grooves it is constantly subject to wear as a result of friction. Consequently, the shape of the groove and rope diameters change as well.

Due to traction, bending and lateral forces, a rope with a smaller diameter

may rest in a slightly deeper and narrower groove. As the diameter of a new rope is usually within an upper tolerance

range, it may not settle in existing deeper and narrower traction sheave grooves. We suggest that the shape of grooves be checked (radius gauge, etc.) if new BRUGG ropes are to be used with previously used traction sheaves. Traction sheaves should be replaced or reconditioned should they deviate from nominal groove dimensions

BRUGG

Brugg Wire Rope, LLC

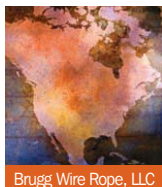
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BRUGG

TECH TIPS: BASIC INFORMATION



Lubrication every 250,000 starts or when the rope or sheave groove feels dry to the touch.

Lubrication is important for moving steel parts. University and technical studies have determined that failing to lubricate can reduce the life of the rope by over 50 percent. You should also review the environment where the hoist ropes are installed. If the elevator is operating in either a very dry (and hot) environment or one that is dusty, you should think seriously on basic lubrication frequency. One critical point behind re-lubrication is to keep the core of the rope (sisal) healthy. When left to dry out, the natural fibers of the core will absorb moisture and degrade. Brugg recommends that in new construction situations, where there is inherently extra dust and exposure, the ropes should be lubricated the first time immediately upon installation completion. This is also an important consideration for ropes that have a full steel core or a mixed core.

Lubrication should be handled professionally as it is critical that the friction between ropes and the sheave must be maintained within certain established upper and lower limits. Too much lubrication can cause loss of car control; ropes that are too dry (un-lubricated) can create excess lifting capacity.

Proper tensioning is key to rope life expectancy and performance.

It is highly recommended that tensions between elevator ropes should be maintained within plus or minus 10%. To accomplish this Brugg offers its RPM (Rope Performance Measurement) device. This highly

accurate device offers professionals a reliable, fast and easy method of checking rope tensions.

Rope tensions should be checked and equalized at installation and then semi-annually at a minimum. As sheaves or ropes wear, or if the system is particularly aggressive to the ropes, a tension check may need to be executed more frequently.

It only takes 15% unequal tension to make a significant impact in the wear and performance of hoist ropes. When the load factor for the highest tension rope is out of proportion, that particular rope will be affected dramatically and will wear quickly. Conversely, low tension ropes may exhibit a sliding action through the sheave groove which can wear both the rope and the sheave.

To put it simply, think of a sheave as your average automobile. Continue the allusion further by imagining hoist ropes running under different loads (or tension) as a set of badly inflated tires on that car. How many miles will those tires last if they are severely under-or over-inflated? A rope running in sheaves subjected to unequal loads (tension) will give you comparable results.

If rope tensions are unequal (from 50% to over 100% percent differences have been observed in the field) it can lead to rapid wear of the outer wires and sheave grooves. Flat spots (wire damage created through wear), bending and high tension can all heighten stress conditions and lead to early rope failure. Naturally our tire metaphor is slightly deficient due to the simple fact that a poorly inflated tire rarely impacts the actual road it travels on. However a badly tensioned rope can damage another part of the elevator hoisting system (e.g. the sheave) creating a problem that can be expensive to correct.

An annual sheave groove profile examination can verify if rope and sheave fit properly.

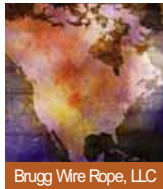
Without proper fit or traction one sacrifices rope or sheave life expectancy. Worn sheaves will wear ropes which can in turn accelerate sheave wear. Either way long-term maintenance costs will increase. A quick check is to simply observe (or to verify through actual measurement) whether all ropes sitting in the sheave grooves are at equal height.

As the original equipment ages bearings wear out.

This causes sheaves to shift one way or the other causing the rope to enter a sheave at an angle. Even if proper care is taken at installation to ensure sheave alignment, this factor comes into play due to normal system wear. "Fleet angles" will then most definitely cause the rope and the sheave to wear improperly and prematurely.

Research has proven that an angle of as little as 4° will reduce the life of a rope by 33% percent. This must especially be considered when one is installing ropes initially as well. It is critical to be certain that ropes are properly aligned as they travel from one sheave to another. Any angle at installation is an automatic deficit in rope life.

Brugg, North America, Wire Rope 0208



BRUGG: ISOLATION ASSEMBLY & COMPONENTS

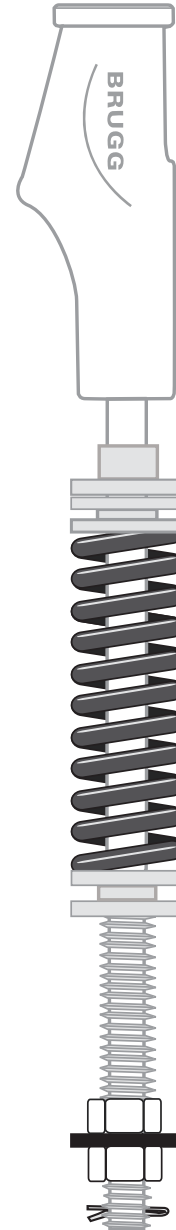
MONTAJES DE AISLAMIENTO Y COMPONENTES

COMPONENT SPECIFICATIONS

- Socket: Cast steel ASTM-A27
- Grade: 60-30 stress relieved
- Rod: Rolled or forged steel ASTM 668
- Wedge: Cast steel ASTM-A27, Grade 60-30
- Standard Finish: Galvanized

ESPECIFICACIONES DE LOS COMPONENTES

- Casquillo: Acero forjado ASTM-A27
- Grado: 60-30 estrés relevado
- Vára: Acero Enrollado o forjado ASTM 668
- Cuña: Acero forjado ASTM-A27, Grado 60-30
- Cabado Estándar: Galvanizado



Brugg_North America_Wire Rope 0508



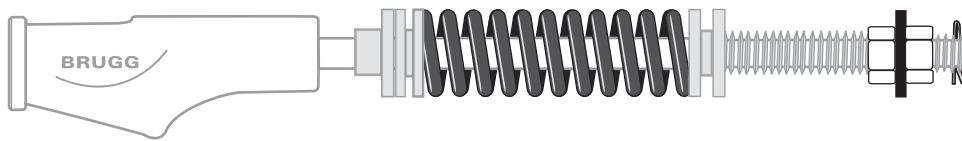
BRUGG: ISOLATION ASSEMBLY & COMPONENTS

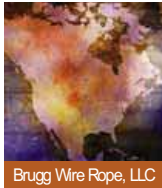
MONTAJES DE AISLAMIENTO Y COMPONENTES

Part Number Número de parte	Size Diámetro	Spring Length (Nom) Longueur Gén. Tige (Nom)	Spring OD. (Nom) Longueur Tige Ext. (Nom)	Spring I.D. (Nom) Longueur tige int. (Nom)	Description Descripción
FWS-ISA-38*	5/16-3/8 in • (8.0-10.0 mm)	4-7/8 in • (124 mm)	1-1/4 in • (32 mm)	11/16 in • (17.5 mm)	3/8 ISOLATION ASSEMBLY
FWS-BUSH-38	5/16-3/8 in • (8.0-10.0 mm)	N/A	N/A	N/A	3/8 ISOLATION BUSH WASHER
FWS-ISCBUSH-38	5/16-3/8 in • (8.0-10.0 mm)	N/A	N/A	N/A	3/8 ISOLATION BUSHING
FWS-SPG-38	5/16-3/8 in • (8.0-10.0 mm)	4-7/8 in • (124 mm)	1-1/4 in • (32 mm)	11/16 in • (17.5 mm)	3/8 ISOLATION SPRING
FWS-ISA-12*	7/16-1/2 in • (10.0-12.7 mm)	6-1/8 in • (156 mm)	1-7/8 in • (48 mm)	1 in • (25.4 mm)	1/2 ISOLATION ASSEMBLY
FWS-BUSH-12	7/16-1/2 in • (10.0-12.7 mm)	N/A	N/A	N/A	1/2 ISOLATION BUSH WASHER
FWS-ISCBUSH-12	7/16-1/2 in • (10.0-12.7 mm)	N/A	N/A	N/A	1/2 ISOLATION BUSHING
FWS-SPG-12	7/16-1/2 in • (10.0-12.7 mm)	6-1/8 in • (156 mm)	1-7/8 in • (48 mm)	1 in • (25.4 mm)	1/2 ISOLATION SPRING
FWS-ISA-58*	9/16-5/8 in • (14.0-16.0 mm)	6-7/8 in • (175 mm)	2-7/16 in • (62 mm)	1-1/4 in • (32 mm)	5/8 ISOLATION ASSEMBLY
FWS-BUSH-58	9/16-5/8 in • (14.0-16.0 mm)	N/A	N/A	N/A	5/8 ISOLATION BUSH WASHER
FWS-ISCBUSH-58	9/16-5/8 in • (14.0-16.0 mm)	N/A	N/A	N/A	5/8 ISOLATION BUSHING
FWS-SPG-58	9/16-5/8 in • (14.0-16.0 mm)	6-7/8 in • (175 mm)	2-7/16 in • (62 mm)	1-1/4 in • (32 mm)	5/8 ISOLATION SPRING
FWS-ISA-34*	11/16-3/4 in • (17.5-19.0 mm)	7 in • (178 mm)	3-11/32 in • (85 mm)	1-49/64 in • (45 mm)	3/4 ISOLATION ASSEMBLY
FWS-BUSH-34	11/16-3/4 in • (17.5-19.0 mm)	N/A	N/A	N/A	3/4 ISOLATION BUSH WASHER
FWS-ISCBUSH-34	11/16-3/4 in • (17.5-19.0 mm)	N/A	N/A	N/A	3/4 ISOLATION BUSHING
FWS-SPG-34	11/16-3/4 in • (17.5-19.0 mm)	7 in • (178 mm)	3-11/32 in • (85 mm)	1-49/64 in • (45 mm)	3/4 ISOLATION SPRING

* Isolation bushing spring assemblies include all components listed above. They DO NOT include the wedge socket.

* Los montajes de aislamiento de resorte y manguito comprenden todos los componentes arriba mencionados. NO incluyen el casquillo acuíñado.





BRUGG: WEDGE SOCKETS

CASQUILLOS ACUÑADOS

The most common end termination method in hoist rope installation uses a wedge socket. This method utilizes a specially constructed socket in which a rope is looped inside and then is secured with the appropriate wedge. When used in tandem both components complete a unique internal configuration that becomes tight when a load is applied to the finished connection. Care must be taken to ensure that the wedge is not reversed in the socket. This could lead to reduced attachment efficiency or breakage. When performed properly installation and shortening can be performed quickly and efficiently.

Each Brugg wedge socket consists of the socket, rod, wedge, 2 nuts, 1 washer, 1 cotter pin and 2 retaining clips. Brugg Wire Rope wedge sockets are tested with 8 x19 extra high-traction steel wire rope and exceed ASME A17.1 Rule 2.20.9 and all other applicable safety codes.

COMPONENT SPECIFICATIONS

- Socket: Cast steel ASTM-A27
- Grade: 60-30 stress relieved
- Rod: Rolled or forged steel ASTM 668
- Wedge: Cast steel ASTM-A27, Grade 60-30
- Standard Finish: Galvanized

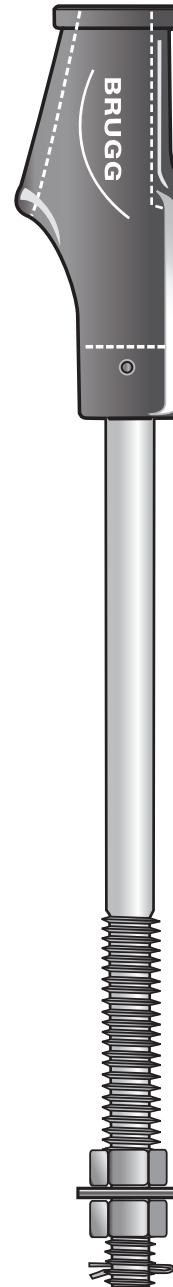
El método más común de asegurar los extremos del cable en la instalación utiliza un casquillo acuíado. Este método utiliza un casquillo especialmente diseñado para recibir un cable que forma una vuelta adentro y después es amarrado con una cuña apropiada. Cuando se usan juntos, los dos componentes completan una configuración interna en la cual son apretados cuando una carga es aplicada a la conexión. Se deben de tomar precauciones para asegurar que la cuña no esté volteada en el casquillo. Puede resultar en un rendimiento de sujeción disminuido o ruptura. Cuando se hace correctamente, la instalación y acortamientos se puede realizar rápidamente y eficazmente.

Cada casquillo acuíado de Brugg consiste de un casquillo, una vara, una cuña, 2 tuercas, 1 arandela, 1 clavija, y 2 pinzas de sujeción. Los casquillos acuíados de Brugg son probados con 8 x19 alta-tracción cable de acero y sobrepasan ASME A17.1 Regla 2.20.9 y todas las normas que se apliquen.

ESPECIFICACIONES DE LOS COMPONENTES

- Casquillo: Acero forjado ASTM-A27
- Grado: 60-30 estrés relevado
- Vara: Acero Enrollado o forjado ASTM 668
- Cuña: Acero forjado ASTM-A27, Grado 60-30
- Cabado Estándar: Galvanizado

MEA 551-06-M



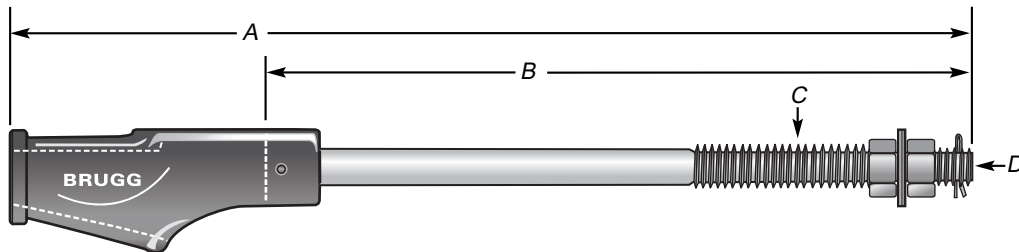
Brugg_North America_Wire Rope_0508

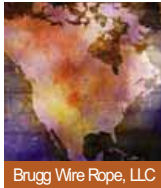


BRUGG: WEDGE SOCKETS

CASQUILLOS ACUÑADOS

Part Number Número de parte	Rope Size Diámetro	Overall Length (Nom)(A) Longitud resorte (Nom)(A)	Rod Length (Nom)(B) Diám. Ext. Resorte(B)(Nom)	Rod Diameter (D) Diámetro (D)	Description Descripción
FVSA-38-12	5/ 16-3/ 8 in •(8.0-10.0 mm)	17-1/ 2 in •(445 mm)	12-19/ 32 in •(320 mm)	27/ 64 in •(10.8 mm)	3/ 8-12 ASSEMBLY
FVSA-38-18	5/ 16-3/ 8 in •(8.0-10.0 mm)	23-3/ 4 in •(603 mm)	18-57/ 64 in •(480 mm)	27/ 64 in •(10.8 mm)	3/ 8-18 ASSEMBLY
FVSA-38-24	5/ 16-3/ 8 in •(8.0-10.0 mm)	30-1/ 8 in •(765 mm)	25-3/ 16 in •(640 mm)	27/ 64 in •(10.8 mm)	3/ 8-24 ASSEMBLY
FVSA-12-12	7/ 16-1/ 2 in •(11.0-12.7 mm)	18 in •(457 mm)	12-19/ 32 in •(320 mm)	23/ 32 in •(18.3 mm)	1/ 2-12 ASSEMBLY
FVSA-12-18	7/ 16-1/ 2 in •(11.0-12.7 mm)	24-3/ 8 in •(619 mm)	18-57/ 64 in •(480 mm)	23/ 32 in •(18.3 mm)	1/ 2-18 ASSEMBLY
FVSA-12-24	7/ 16-1/ 2 in •(11.0-12.7 mm)	30-5/ 8 in •(778 mm)	25-3/ 16 in •(640 mm)	23/ 32 in •(18.3 mm)	1/ 2-24 ASSEMBLY
FVSA-12-30	7/ 16-1/ 2 in •(11.0-12.7 mm)	36-7/ 8 in •(937 mm)	31-1/ 2 in •(800 mm)	23/ 32 in •(18.3 mm)	1/ 2-30 ASSEMBLY
FVSA-12-36	7/ 16-1/ 2 in •(11.0-12.7 mm)	43-1/ 4 in •(1099 mm)	37-51/ 64 in •(960 mm)	23/ 32 in •(18.3 mm)	1/ 2-36 ASSEMBLY
FVSA-58-12	9/ 16-5/ 8 in •(14.0-16.0 mm)	19-3/ 4 in •(502 mm)	12-19/ 32 in •(320 mm)	23/ 32 in •(18.3 mm)	5/ 8 -12 ASSEMBLY
FVSA-58-18	9/ 16-5/ 8 in •(14.0-16.0 mm)	26-1/ 8 in •(664 mm)	18-57/ 64 in •(480 mm)	23/ 32 in •(18.3 mm)	5/ 8 -18 ASSEMBLY
FVSA-58-24	9/ 16-5/ 8 in •(14.0-16.0 mm)	32-3/ 8 in •(924 mm)	25-3/ 16 in •(640 mm)	23/ 32 in •(18.3 mm)	5/ 8-24 ASSEMBLY
FVSA-58-30	9/ 16-5/ 8 in •(14.0-16.0 mm)	38-3/ 4 in •(984 mm)	31-1/ 2 in •(800 mm)	23/ 32 in •(18.3 mm)	5/ 8-30 ASSEMBLY
FVSA-58-36	9/ 16-5/ 8 in •(14.0-16.0 mm)	45 in •(1143 mm)	37-51/ 64 in •(960 mm)	23/ 32 in •(18.3 mm)	5/ 8-36 ASSEMBLY
FVSA-34-12	11/ 16-3/ 4 in •(17.5-19.0 mm)	20.9 in •(530 mm)	12-19/ 32 in •(320 mm)	55/ 64 in •(22.0 mm)	3/ 4-12 ASSEMBLY
FVSA-34-18	11/ 16-3/ 4 in •(17.5-19.0 mm)	27.2 in •(690 mm)	18-57/ 64 in •(480 mm)	55/ 64 in •(22.0 mm)	3/ 4-18 ASSEMBLY
FVSA-34-24	11/ 16-3/ 4 in •(17.5-19.0 mm)	33.5 in •(850 mm)	25-3/ 16 in •(640 mm)	55/ 64 in •(22.0 mm)	3/ 4-24 ASSEMBLY
FVSA-34-30	11/ 16-3/ 4 in •(17.5-19.0 mm)	39.8 in •(1010 mm)	31-1/ 2 in •(800 mm)	55/ 64 in •(22.0 mm)	3/ 4-30 ASSEMBLY
FVSA-34-36	11/ 16-3/ 4 in •(17.5-19.0 mm)	46.1 in •(1170 mm)	37-51/ 64 in •(960 mm)	55/ 64 in •(22.0 mm)	3/ 4 -36 ASSEMBLY





BRUGG

BRUGG: WEDGE SOCKET ACCESSORIES

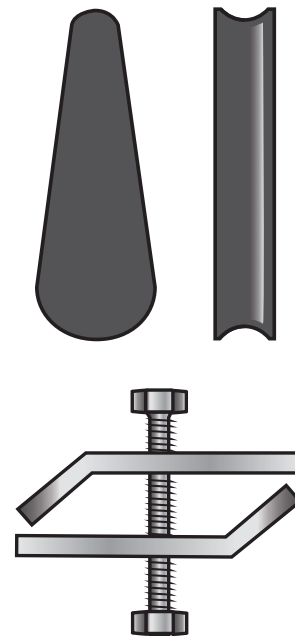
ACCESORIOS DEL CASQUILLO ACUÑADO

COMPONENT SPECIFICATIONS

- Socket: Cast steel ASTM-A27
- Grade: 60-30 stress relieved
- Rod: Rolled or forged steel ASTM 668
- Wedge: Cast steel ASTM-A27, Grade 60-30
- Standard Finish: Galvanized

ESPECIFICACIONES DE LOS COMPONENTES

- Casquillo: Acero forjado ASTM-A27
- Grado: 60-30 estrés relevado
- Vára: Acero Enrollado o forjado ASTM 668
- Cuña: Acero forjado ASTM-A27, Grado 60-30
- Cebado Estándar: Galvanizado

WEDGE SOCKET COMPONENTS
COMPONENTES DE CASQUILLO ACUÑADO

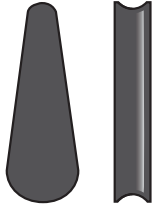
Part Number Número de parte	Size Diámetro	Description Descripción
WS-COTPIN-38	5/ 16-3/ 8 in • (8.0-10.0 mm)	3/ 8 COTTER PIN
WS-WSHR-38	5/ 16-3/ 8 in • (8.0-10.0 mm)	3/ 8 WASHER
WS-WSNUT-38	5/ 16-3/ 8 in • (8.0-10.0 mm)	3/ 8 WASHER NUT
WS-COTPIN-12	7/ 16-1/ 2 in • (11.0-12.7 mm)	1/ 2 COTTER PIN
WS-WSHR-12	7/ 16-1/ 2 in • (11.0-12.7 mm)	1/ 2 WASHER
WS-WSNUT-12	7/ 16-1/ 2 in • (11.0-12.7 mm)	1/ 2 WASHER NUT
WS-COTPIN-58	9/ 16-5/ 8 in • (14.0-16.0 mm)	5/ 8 COTTER PIN
WS-WSHR-58	9/ 16-5/ 8 in • (14.0-16.0 mm)	5/ 8 WASHER
WS-WSNUT-58	9/ 16-5/ 8 in • (14.0-16.0 mm)	5/ 8 WASHER NUT
WS-COTPIN-34	11/ 16-3/ 4 in • (17.5-19.0 mm)	3/ 4 COTTER PIN
WS-WSHR-34	11/ 16-3/ 4 in • (17.5-19.0 mm)	3/ 4 WASHER
WS-WSNUT-34	11/ 16-3/ 4 in • (17.5-19.0 mm)	3/ 4 WASHER NUT

Brugg_North America_Wire Rope_0508



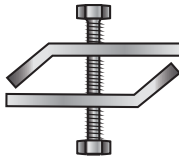
BRUGG: WEDGE SOCKET ACCESSORIES

ACCESORIOS DEL CASQUILLO ACUÑADO



WEDGE SOCKET WEDGES CUÑAS PARA CASQUILLO ACUÑADO

Part Number Número de parte	Size Diámetro	Description Descripción
FWS-WEDGE3812	5/ 16-1/ 2 in • (8.0-12.7 mm)	3/ 8-1/ 2 WEDGE (yellow, jaune, amarillo)
FWS-WEDGE58	9/ 16-5/ 8 in • (14.0-16.0 mm)	5/ 8 WEDGE (black, noire, negro)
FWS-WEDGE34	11/ 16-3/ 4 in • (17.5-19.0 mm)	3/ 4 WEDGE (red, rouge, rojo)



WEDGE SOCKET RETAINING CLIPS PRESILLAS DE RETENCIÓN PARA CASQUILLO ACUÑADO

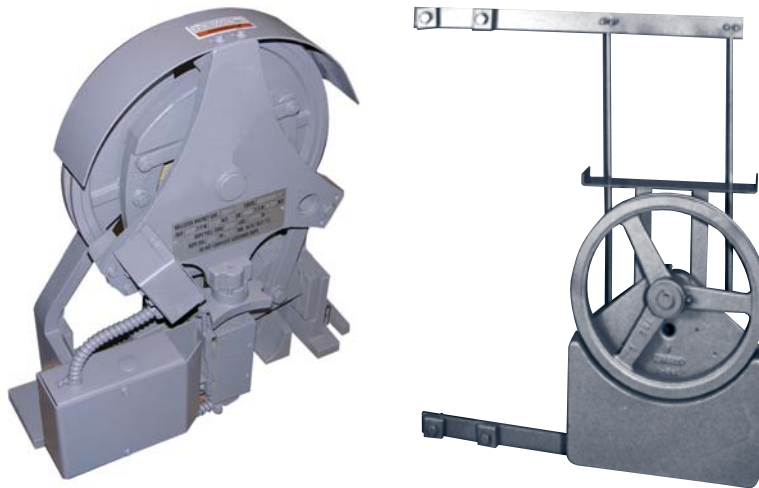
Part Number Número de parte	Size Diámetro	Description Descripción
FWS-RTCLP-38	5/ 16-3/ 8 in • (8.0-10.0 mm)	3/ 8 RETAINING CLIP
FWS-RTCLP-1258	7/ 16-5/ 8 in • (11.0-16.0 mm)	1/ 2-5/ 8 RETAINING CLIP
FWS-RTCLP-34	11/ 16-3/ 4 in • (17.5-19.0 mm)	3/ 4 RETAINING CLIP



Overspeed Governor

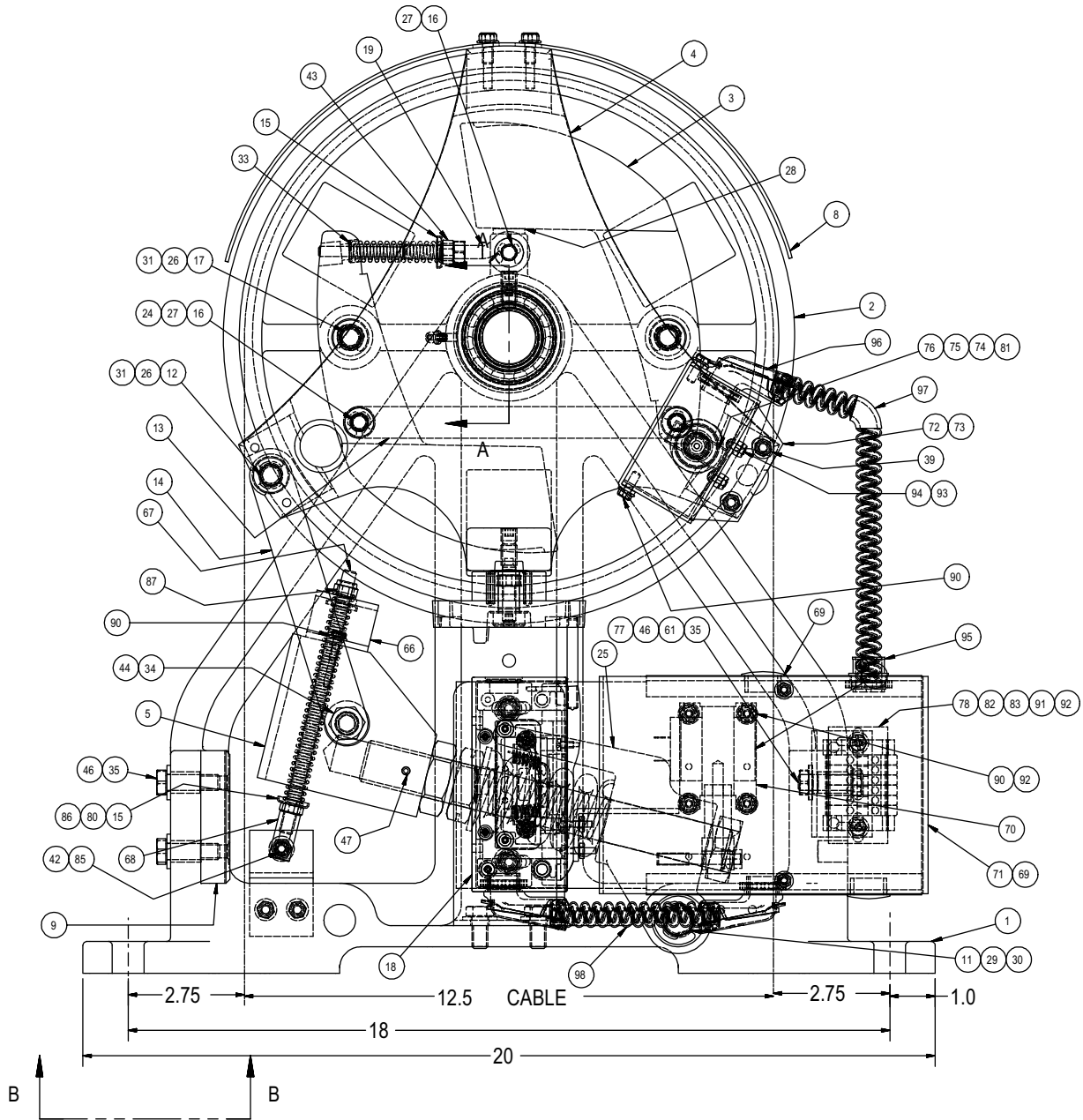
By code, overspeed governors may not be repaired or modified in any substantial fashion. Maintenance is primarily cleaning, visual checks, and occasional lubrication:

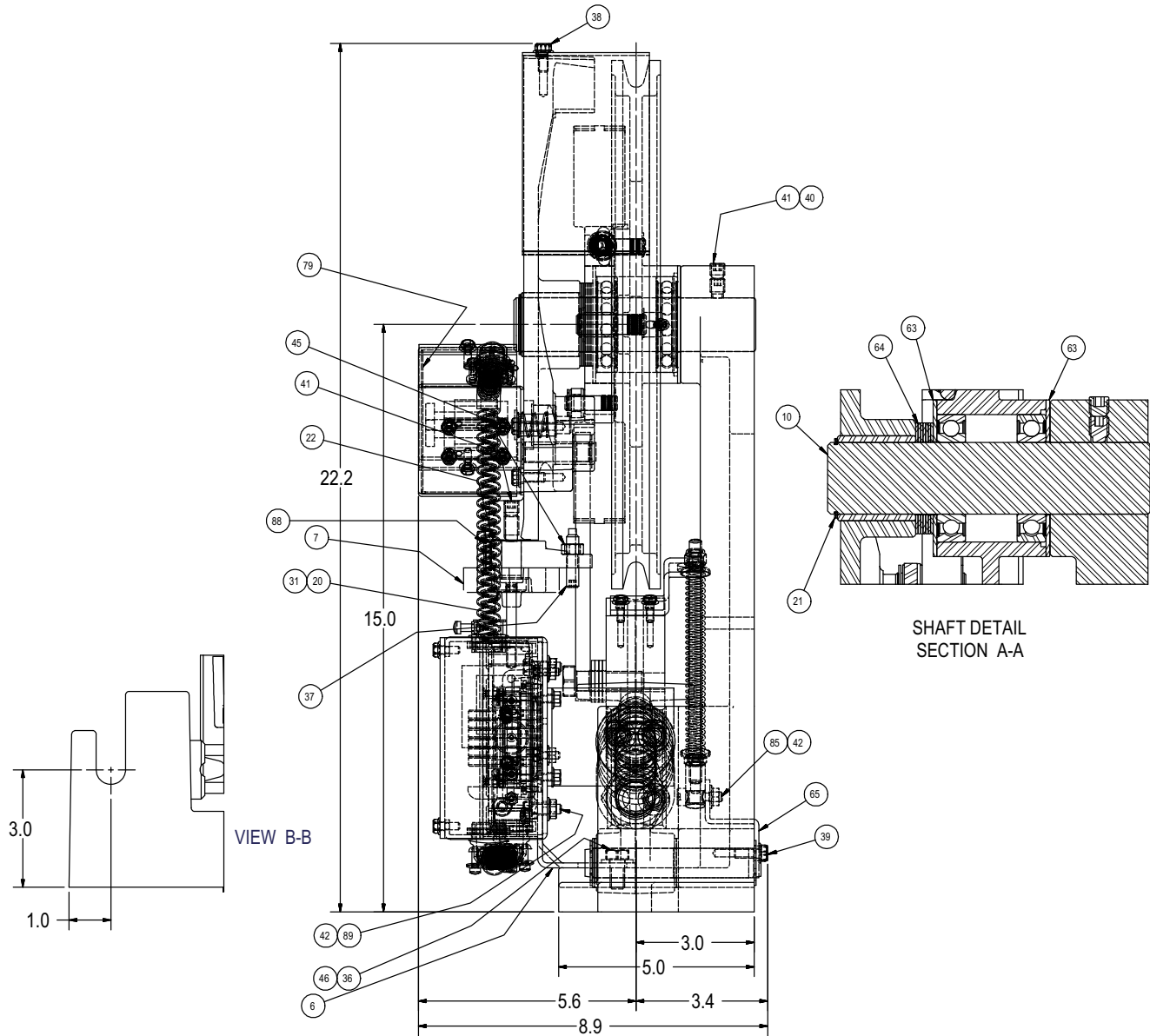
- Every six months, the overspeed governor should be checked for proper operation.
- During normally scheduled overhead maintenance:
 - Check for damage or distortion of governor structural elements.
 - Check for sheave groove wear on the governor (and the tension weight sheave as well).
 - Check that the rocker lever moves freely. Lubricate if necessary.
 - Check the governor rope for wear or damage. DO NOT lubricate governor rope.
 - Check safety switch function by operating it by hand.
 - Keep the governor free of dirt and debris.



Governor Technical Drawings

Governor technical drawings are included on the following pages.





ITEM	PART #	NO. REQ'D	DESCRIPTION
1	207 - 001-RS	1	Governor Base - Resetting
2	207 - 037	1	Governor Sheave, 0.375" Cable
3	205 - 003	1	Pawl (Weight)
	205 - 003A	1	Pawl (Weight)
4	207 - 051	1	Yoke Assembly
5	207 - 005-RS	1	Head - Resetting Hammer (0.375" Cable)
6	201 - 007-RS	1	Bracket - Speed Switch
7	201 - 009-RS	1	Trigger - Resetting Speed Switch
8	205 - 011	1	Guard - Sheave
9	205 - 012	1	Grip (0.375" Cable)
10	201 - 014	1	Main Shaft - Standard
11	201 - 016	1	Pin (0.75") - Hammer Pivot
12	205 - 017	1	Pin (0.50") - Hammer Link
13	205 - 018	1	Link - Pawl
14	201 - 019	1	Link - Hammer
15	205 - 020	3	Washer, Cup - Spring Retainer
16	205 - 021	3	Pin (0.375") - Pawl
17	205 - 022	2	Pin (0.50") - Pawl Pivot
18	201 - 023-RS	1	Switch - Resetting Speed
19	205 - 024	1	Eyebolt
20	201 - 027	1	Screw - Socket Head Shoulder (0.5 x 1.0)
21	201 - 029	1	Retaining Ring, Smalley #WSM-137
22	201 - 030	3	Washer - Bowed (Hubbard)
23	201 - 032	2	Dust Cap
24	205 - 036	2	Bushing - Nylon
25	207 - 039	1	Hammer Pivot Assembly
26	201 - 041	6	E-ring - Truarc (#5133-50)
27	201 - 042	6	E-ring - Truarc (#5133-37)
28	205 - 059	1	Cork/Rubber Pad
29	90 - 033	2	E-ring - Truarc (#X-5133-74)
30	90 - 034	As Nec.	Washer - Spacer (0.75")
31	460 - 034	As Nec.	Washer - Spacer (0.50")
33	400 - 014	1	Spring - 175 to 225 fpm - Trip
	400 - 013	1	Spring - 226 to 308 fpm - Trip
	400 - 025	1	Spring - 309 to 395 fpm - Trip
	400 - 069	1	Spring - 396 to 625 fpm - Trip
34	-	1	Bolt - HexHead (.5 NC x 1.75")
35	-	3	Bolt - HexHead (.375 NC x 1.25")
36	-	2	Bolt - HexHead (.375 NC x .75")
37	-	1	Screw - Full Dog Set (.313 UNF x 1.5")
38	-	2	Bolt - HexHead Whiz (.25 NC x .5")
39	-	4	Bolt - HexHead Whiz (.25 NC x .625")
40	-	1	Screw - Half Dog Set (.375 NC x .375")

41	-	2	Screw - Knurled Cup Set (.375 NC x .375")
42	-	3	Nut - Whiz (.25 NC)
43	-	2	Nut - Jam (.313" NC)
44	-	As Nec.	Washer - 0.5" Standard
45	-	1	Nut - Jam (.313" UNF)
46	-	6	Washer - Standard (.375")
47	-	1	Roll Pin - .188 x 1.5"
48	-	2	Lead Seal
49	-	1	Data Tag
50	-	2	Rivets - Data Tag
61	-	1	Nut - Jam (0.375" NC)
63	201 - 043	2	Washer
64	192 - 006	7	Washer - Spacer
65	207 - 081	1	Bracket - Lower Guide Rod Pivot
66	207 - 082	1	Bracket - Upper Guide Rod
67	207 - 083	1	Guide Rod - Hammer Head Return
68	207 - 084	1	Pivot Base - Hammer Head Spring Guide
69	207 - 086	1	Bracket - Solenoid & Terminal Block
70	207 - 087	1	Reset Solenoid Assembly - Governor
71	207 - 088	1	Cover - Solenoid & Terminal Block Bracket
72	207 - 089	1	Bracket - Remote Trip Solenoid
73	207 - 089-1	1	Cover - Remote Trip Solenoid Bracket
74	207 - 090	1	Pin Guide - Remote Trip
75	207 - 091	1	Pin - Remote Trip
76	207 - 092	1	Solenoid - Remote Trip Pin
77	207 - 093	1	Brace - Switch Bracket
78	207 - 094	1	DIN Rail
79	207 - 095	1	Coil Isolation
80	400 - 079	1	Spring - Hammer Head Return
81	400 - 080	1	Spring - Trip Pin Return
82	GL100 - 159-5	2	Terminal Block End
83	GL100 - 159-7	6	Terminal Block
85	-	1	5/16 x 0.5 Socket Head Shoulder Bolt
86	-	1	5/16 UNC Jam Nut
87	-	1	5/16 UNC Nylock Nut
88	-	2	3/16 x 0.75" Roll Pin
89	-	2	Whiz Bolt 0.25x20-0.75
90	-	10	#10-24 x 0.5 Whiz Bolt
91	-	2	#10-24 x 0.5 RHMS
92	-	6	#10-24 Whiz Nut
93	-	4	#6-32 x 0.375 RHMS
94	-	4	#6-32 Nylock Nut
95	-	1	3/8 Box Connector 501-DC2
96	-	3	3/8 90° Angle Box Connector 801-DC2
97	-	1	3/8 Flex Conduit (6.5 or 11")
98	-	1	3/8 Flex Conduit (5")
	460 - 036	As Nec.	Washer - Spacer (0.375")

Guide Rails

In the normal course of service, properly specified and installed guide rails should require no regular maintenance.

Examinations

Periodically inspect the guide rails from the car top.

- Verify that all joints are secure and aligned.
- Verify that all clips and brackets remain secure and undistorted.

Guide Rail-Mounted Equipment

1. Verify that the car locking device receiver plate is securely in place.
2. Verify that the governor mounting assembly (if used) is securely in place.

Cleaning

Periodically check that guide rails are clean and free of rust.

Roller Guides

Please refer to the ELSCO roller guide information included under OEM Inclusions on [page 5-13](#).

Car and Counterweight Buffers

MCE uses both hydraulic and spring buffers. Hydraulic buffers are used for car speeds above 200 feet per minute. Buffers are generally installed on buffer stands whose height is dependent on the specific requirements of each installation.

Examinations

Spring Buffers

Every six months, visually examine spring buffers to ensure they are:

- Securely fastened in place (both buffers and stands)
- Vertical and aligned with striker plates on car and counterweight
- Springs are properly seated in cup or other mounting
- Springs are not deformed, obviously weakened, or damaged
- That the buffer marking plates are in place and correctly describe the buffer

Note

Buffer springs and sleeves are matched sets. Together, they determine the buffer stroke and capacity. Pay careful attention that springs and buffers are not mixed.

Hydraulic Buffers

Every six months, visually examine hydraulic buffers to ensure they are:

- Securely fastened in place (both buffers and stands)
- Vertical and aligned with striker plates on car and counterweight
- That the buffer marking plates are in place and correctly describe the buffer
- That there is no evidence of fluid leakage
- That the extended buffer is the correct height

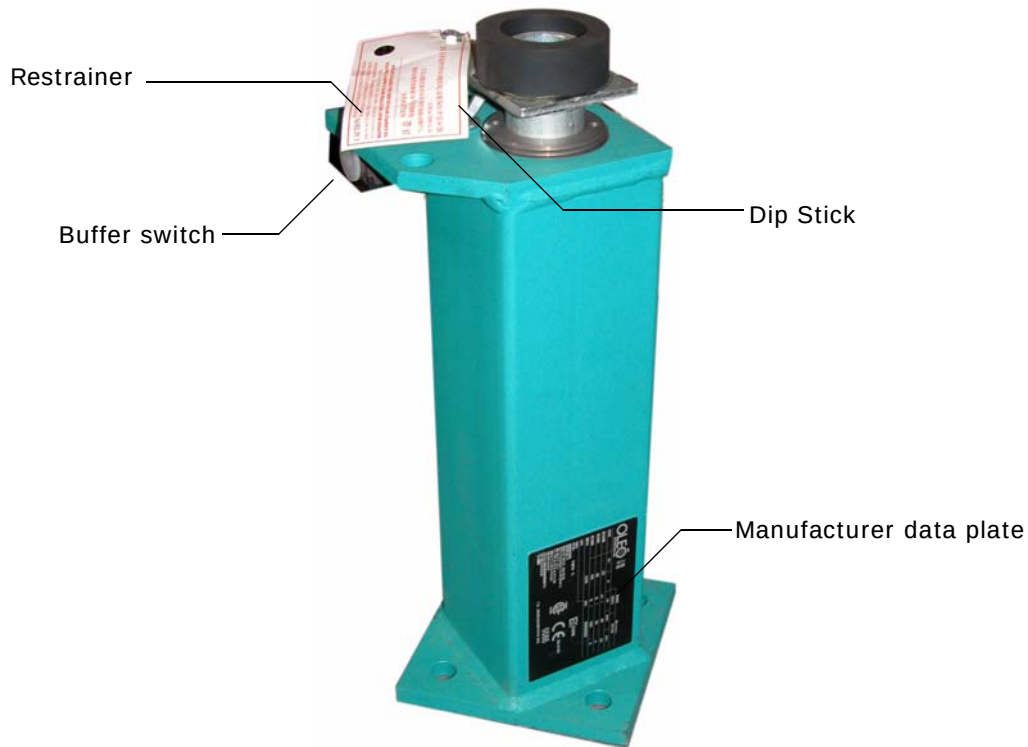
Table 6-6 Buffer Oil

Mobil	Esso	Shell	Sunoco	Texaco
D.T.E. 26	Nuto H 68	Tellus Oil 68	Sunvis 831 WR	Rando oil HDC 68
These hydraulic oils meet ISO VG 68 requirements.				

Maintenance

Spring buffers require no maintenance. Hydraulic buffers must be extended and filled with oil before use and the oil level periodically checked thereafter.

Figure 6.1 Hydraulic Buffer



- Restrainer: Allows the buffer to be held in a compressed position during shipment. Once a buffer is mounted in place, the restrainer is released to allow the buffer to extend. See Danger below.



Danger

Buffer may extend quickly! Keep out of the way.

- Dip stick: The dip stick is topped with a wing nut. Lightly tightening the wing nut secures the dip stick and seals against possible contamination. After installing and extending the buffer, you remove the dip stick and fill the buffer with the proper hydraulic oil. Thereafter, you can check oil level using the dip stick.

Note

After initial fill, allow the buffer to sit for thirty minutes before checking level. Add more oil if needed.

- Buffer switch: Connect in the elevator safety string as shown in the job prints.
- Manufacturer data plate: Describes the buffer and indicates oil type.

Table 6-7 Buffer Specifications

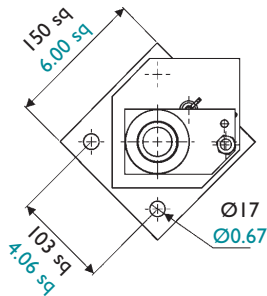
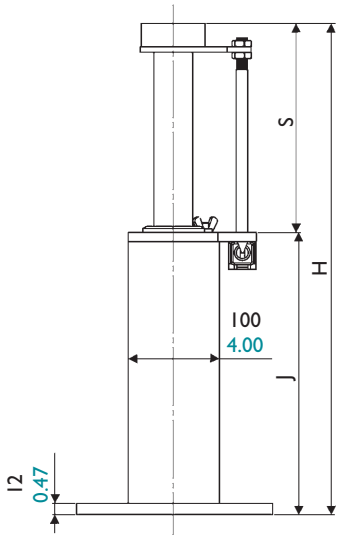
Model	Min Stroke in (mm)	Overall Height in (mm)	Oil Volume USG (liters)
SEB 16	6.81 (173)	21.26 (540)	0.4 (1.45)
SEB 18	8.62 (219)	25.32 (643)	0.47 (1.77)
SEB 20	10.98 (279)	30.59 (777)	0.60 (2.20)
SEB 25	17.13 (435)	44.33 (1126)	0.87 (3.30)
LB 16	7.99 (203)	24.26 (616)	1.22 (4.62)
LB 18	9.8 (249)	28.43 (722)	1.47 (5.58)
LB 20	11.81 (300)	33.00 (838)	1.75 (6.64)
LB 23	15.24 (387)	40.83 (1037)	2.23 (8.45)
LB 25	18.19 (462)	47.64 (1210)	2.64 (10.00)
LB 32	27.52 (699)	67.13 (1705)	5.28 (20.00)
LB 35	34.68 (881)	82.96 (2107)	6.47 (24.50)
LB 40	44.92 (1141)	105.98 (2692)	8.32 (31.50)

standard installations

wide range
for all applications

Oleo SEB Series
1.6 - 2.54 m/s 315 - 500 ft/min
450 - 4545 kg 990 - 10,000 lbs

Model		SEB 16.2
Rated speed	m/s ft/min	1.60 315
Maximum striking speed	m/s ft/min	1.84 362
Impact mass range	kg lbs	450-4545 992-10,020
Stroke ' S '	mm ins	173 6.81
Height ' H '	mm ins	536 21.10
Height ' J '	mm ins	306 12.05
Unit weight (less oil)	kg lbs	11.20 24.69
Oil volume ISO VG 68	litres U.S gals	1.45 0.38



Environmental temperature acceptable conditions -15°C to +70°C
Note: for special conditions outside the above consult OLEO International

Buffer must be securely supported and steadied vertically, parallel to guide rails $\pm$ 5mm
Non vertical applications consult OLEO International

Buffer to be mounted in a suitable structure to support deceleration forces in accordance with installation sheet.



SEB 18.2	SEB 20.2	SEB 25.2
1.80 355	2.03 400	2.54 500
2.07 408	2.34 460	2.92 575
450-4545 992-10,020	450-4545 992-10,020	450-4545 992-10,020
219 8.62	279 10.98	435 17.13
639 25.15	773 30.43	1122 44.17
363 14.29	437 17.20	630 24.80
12.80 28.22	14.80 32.63	20.00 44.10
1.77 0.46	2.20 0.58	3.30 0.87



SEB 16.2 SEB 18.2 SEB 20.2 SEB 25.2

Designed to provide a cost effective solution to applications between 1.6 and 2.54m/s rated speed. The exceptionally wide mass range simplifies buffer selection, whilst reducing inventory.

All SEB buffers are maintenance free subject to statutory routine inspection.

Options available include :

- switch assembly,
- optional base plate sizes,
- outdoor use
- explosion proof





high
performance

heavy installations

Oleo LB Series - heavy installations

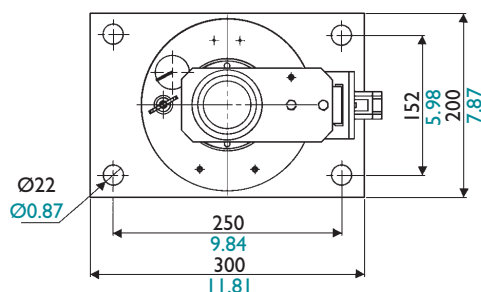
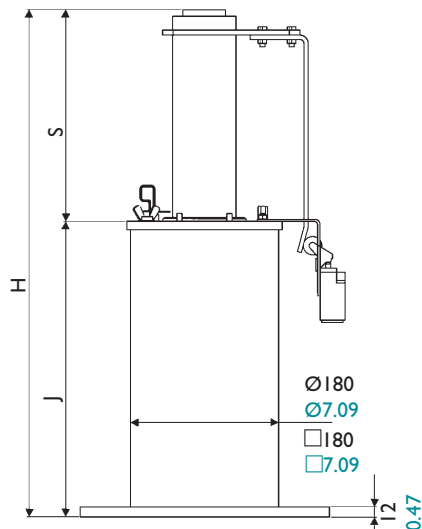
1.6 - 4.06 m/s 315 - 800 ft/min

500 - 8330 kg 1100 - 18,360 lbs

Model		LB 16.003	LB 18.001	LB 20.001	LB 23.001
Rated speed	m/s	1.60	1.80	2.03	2.30
	ft/min	315	355	400	453
Maximum striking speed	m/s	1.84	2.07	2.34	2.65
	ft/min	362	408	460	522
Impact mass range	kg	500 - 8330	500 - 8330	500 - 8330	500 - 8330
	lbs	1102 - 18,364	1102 - 18,364	1102 - 18,364	1102 - 18,364
Stroke 'S'	mm	203	249	300	387
	ins	7.99	9.80	11.81	15.24
Height 'H'	mm	609	715	831	1030
	ins	23.98	28.15	32.72	40.55
Height 'J'	mm	355	414	479	591
	ins	13.98	16.30	18.86	23.27
Unit weight (less oil)	kg	25.70	28.20	30.70	36.20
	lbs	56.67	62.18	67.69	79.82
Oil volume ISO VG 68	litres	4.62	5.58	6.64	8.45
	U.S gals	1.22	1.47	1.75	2.23

Note : reduced stroke : with approved terminal speed limiting device, applying EN 81.1 rule 10.4.3.2 (ASME A17.1 rule 201.4a))

Rated speed	m/s				
	ft/min				



Environmental temperature acceptable conditions -15°C to +70°C

Note: for special conditions outside the above consult OLEO International

Buffer must be securely supported and steadied vertically, parallel to guide rails +_ 5mm
Non vertical applications consult OLEO International

Buffer to be mounted in a suitable structure to support deceleration forces in accordance with installation sheet



LB 16.003



LB 18.001

Driving Machine

MCE uses AC, permanent magnet, gearless, synchronous machines from Imperial Electric. Please refer to the manual that accompanied the machine for complete information. The information provided here is very basic.

Examinations and Maintenance

Periodic maintenance is critical to machine operation.

Monthly

- Inspect visually. Check for wear, debris, lubricant leakage, and any evidence of heating or abnormal operation.
- Clean using a dry cloth. If compressed air is used, it must be dry and not over 30 PSI.
- Check for proper brake operation.

Semi-Annually

- Complete all monthly checks.
- Check brake shoe lining and clearance. Adjust if necessary.
- Check all brake pivot bearings.
- Lubricate brake shoe pins.
- Check groove wear and cable tension.
- Lubricate machine per instructions.

Handling

- If possible, lift machine as a single unit.
- Anchor lifting sling at each eyebolt.
- Use spreader bars to prevent damage.

Storage

- Store in warm, dry, clean location.
- Protect from dust and dirt – particularly concrete dust which can penetrate bearing fits.

Extended Storage

Brake pins, brake drum, sheave, and solenoid parts are coated with a rust-preventative oil before shipment. (Shields are placed between the brake shoes and the braking surface to protect the brake linings.)

If the machine is stored beyond thirty days:

- Store in sealed, waterproof enclosure with appropriate dehydrating sachet.
- Periodically check and re-lubricate protected parts if needed. If necessary, remove any rust with a fine abrasive paper before relubricating.
- Do not allow oil or solvent on brake linings.

Inspection

Especially if the machine has been stored beyond thirty days and before connecting any wiring:

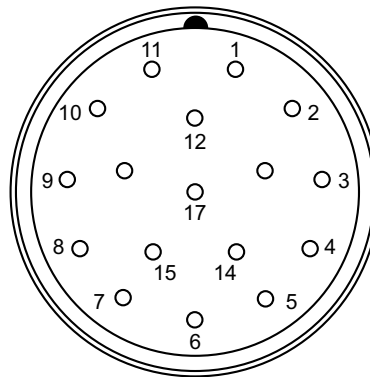
- Check that there is no condensation. If there is condensation, contact manufacturer for drying instructions before proceeding.
- Use a megohm meter to check insulation between motor phases and ground terminal. Minimum 100M ohms @ 500VDC for 60 seconds.

Encoder

Imperial PMAC machines use a Heidenhain™ ECN1313 encoder. Pinout and general specifications follow.

Pins on encoder are male

Pin	Signal
7	Up (Power supply voltage)
1	Sensor Up
10	0V
4	Sensor 0V
11	Inside Shield
15	A +
16	A -
12	B +
13	B -
14	DATA
17	DATA
8	CLOCK
9	CLOCK



DO NOT USE VACANT PINS OR WIRES

Table 6-8 ECN1313 Encoder Information

Criteria	Description
Data interface	EnDat
Positions per rev	8192 (13 bit)
Incremental signals	1Vpp
Line count	2048
Power supply	5V +/- 5%
Max current consumption w/o load	150 mA
Max cable length	150m/492ft

Brake Adjustment

Refer the Imperial Electric manual accompanying the specific machine.

Lubrication, 475/478, 522/525 ACPM Machines

This instruction describes lubricating the 475, 478, 522, and 525 Series ACPM machines from MCE. Failure to keep machines properly lubricated will result in loss of warranty. Lubricate once every 3000 hours or 6 months of operation.



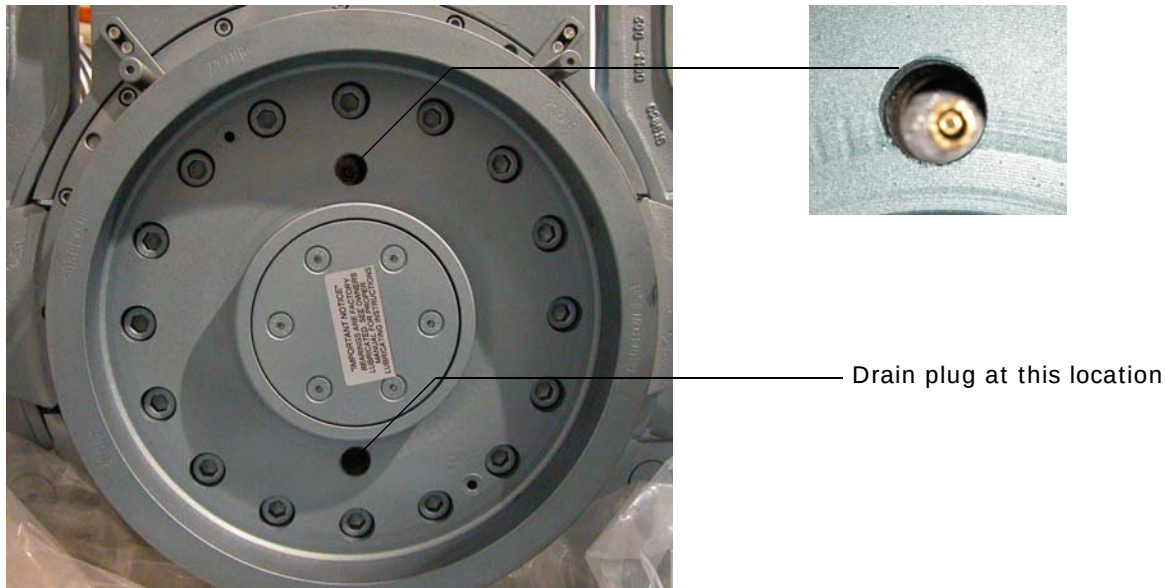
Caution

SKF LGEP 2 grease is the only recommended bearing lubricant for this motor. The use of any other grease is the sole responsibility of the user and may void the warranty.

475/478

475 and 478 machine sheave-end bearings require lubrication. The encoder-end bearing is permanently sealed and does not require lubrication.

Figure 7. Lube Point Locations on Front of Machine



1. Using a 12mm internal-hex wrench, remove the plugs covering the lubrication points.
2. Rotate the machine until the lubrication fitting is at 12 and the drain fitting at 6 o'clock (vertically aligned). Remove the motor from service. Clean grease fitting and drain plug areas.
3. Using an 11mm, deep socket, remove the drain fitting from the bottom access point.
4. Lubricate the top fitting with SKF LGEP2 grease (475: 0.75 oz/21g, 478: 1.0 oz/ 27g).



Caution

Do not overfill bearing reservoir by pumping grease until it comes out the drain. This will cause permanent bearing damage. Use only the recommended amount of lubricant.

5. Replace the drain fitting.
6. Clean lubrication and drain points. Re-insert plugs.

522/525

500 series machine sheave and encoder end bearings both require lubrication.

Figure 8. 500 Series Lubrication Points

**Front and/or Rear**

1. Remove the motor from service. Clean the grease fitting and drain plug. Using a 17mm socket, remove the drain plug.
2. Lubricate the top fitting with SKF LGEP2 grease (sheave-end, 1.75 oz/55 g; encoder end 0.50 oz/15.3 g).

**Caution**

Do not overfill bearing reservoir by pumping grease until it comes out the drain. This will cause permanent bearing damage. Use only the recommended amount of lubricant.

3. Replace the drain plug.
4. Clean lubrication and drain points.

Doors and Door Operator

Doors

1. Visually examine doors for broken, bent, or sprung members.
2. Cycle doors to verify smooth operation.
3. Check that sill guide tracks and gibs are in place and not excessively worn.
4. Clean sill grooves.
5. Lubricate moving parts as required.

Door Closing Force

Proper closing force exerted in various conditions.

- Bring the car to a floor.
- Start closing the doors but block them with an appropriate object between 1/3 and 2/3 of normal travel.
- Insert a force measuring device and remove the blocking object. Gently back off on the device until the doors just start to move. This is the point of measurement.
 - Normal closing force cannot exceed 30 lbf (133.44 N).
 - Verify door operator data plate attached to car crosshead or door power operator.

Measuring Door Closing Force

To measure door closing force:

1. Park the car at a floor.
2. Begin to close the doors. Allow them to close 1/3 to 2/3 of their normal travel, then stop them.
3. Insert a force measuring device appropriate to measure 30 lbf against the stopped door. Slowly release the doors so that they are now held stationary by the measuring device.
4. Slowly back off on the device until the door just starts to move. At this point, the door and measuring forces are approximately equal and the closing force value may be read.

Door Closing Time Compliance

If you are installing a job in a jurisdiction requiring compliance to Requirement 2.13.4.2.4 of ASME A17.1-2000 you must apply a Door Data Plate label (included with operator or operator manual) to the door operator or crosshead. The data tags must be properly completed to show:

- Month and year of installation
 - Typical floor door mass
 - Minimum code closing time (resulting in average kinetic energy of less than 7.37 foot pounds) at normal closing speed with typical floor door mass
 - Minimum code closing time (resulting in average kinetic energy of less than 2.50 foot pounds) at reduced/nudging closing speed with typical floor door mass
- Heavy door mass (where applicable) and landings affected
 - Minimum code closing time (resulting in average kinetic energy of less than 7.37 foot pounds) at normal closing speed with heavy door mass
 - Minimum code closing time (resulting in average kinetic energy of less than 2.50 foot pounds) at reduced/nudging closing speed with heavy door mass

The “Minimum Closing Time” tables on the following pages reflect an average kinetic energy of 7.37 foot pounds (2.50 foot pounds, nudging) and provide the minimum code closing times for most normal door configurations and sizes (normal and nudging operation).

When using the tables, consider:

- Closing Time/Distance: For side opening doors, code distance starts two-inches (2”) from the jamb and ends two-inches (2”) from full close. For center opening doors, code distance starts one-inch (1”) from the jamb and ends one-inch (1”) from full close.
- Average Kinetic Energy (7.37 foot pounds): Table times are based on this energy calculation. Calculations include “equipment rigidly connected thereto”, all hangers, rollers, clutches, releases, closers, and reopening devices, and the rotational inertia of the motor and operator.
- Actual Kinetic Energy (peak energy, 17.00 foot pounds): Using MCE equipment and following instructions carefully, you should not exceed the actual kinetic energy requirement if your door closing time complies with the time shown in the table for your door.
- Reduced/Nudging Kinetic Energy (2.50 foot pounds): If the performance requirements of the job allow, nudging speed closing time can safely be calculated as twice the normal closing time. If performance demands greater speed, please contact MCE Technical Support for assistance.

Table 6-9 Center Parting Doors

MINIMUM CLOSING TIME FOR CENTER PARTING DOORS (sec)																							
Door Opening Width (inch) (1) Code Zone Distance (inch)	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66		
	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
(2) Combined Weight of Car and Hoistway Doors and All Attached Equipment (lbs)	100	0.42	0.46	0.50	0.54	0.57	0.61	0.65	0.69	0.73	0.77	0.80	0.84	0.88	0.92	0.96	0.99	1.03	1.07	1.11	1.15	1.19	
	150	0.52	0.56	0.61	0.66	0.70	0.75	0.80	0.84	0.89	0.94	0.98	1.03	1.08	1.12	1.17	1.22	1.26	1.31	1.36	1.41	1.45	
	200	0.60	0.65	0.70	0.76	0.81	0.87	0.92	0.97	1.03	1.08	1.14	1.19	1.24	1.30	1.35	1.41	1.46	1.51	1.57	1.62	1.68	
	250	0.67	0.73	0.79	0.85	0.91	0.97	1.03	1.09	1.15	1.21	1.27	1.33	1.39	1.45	1.51	1.57	1.63	1.69	1.75	1.81	1.87	
	300	0.73	0.80	0.86	0.93	0.99	1.06	1.13	1.19	1.26	1.33	1.39	1.46	1.52	1.59	1.66	1.72	1.79	1.86	1.92	1.99	2.05	
	350	0.79	0.86	0.93	1.00	1.07	1.14	1.22	1.29	1.36	1.43	1.50	1.57	1.65	1.72	1.79	1.86	1.93	2.00	2.08	2.15	2.22	
	400	0.84	0.92	0.99	1.07	1.15	1.22	1.30	1.38	1.45	1.53	1.61	1.68	1.76	1.84	1.91	1.99	2.07	2.14	2.22	2.30	2.37	
	450	0.89	0.97	1.05	1.14	1.22	1.30	1.38	1.46	1.54	1.62	1.70	1.79	1.87	1.95	2.03	2.11	2.19	2.27	2.35	2.43	2.52	
	500	0.94	1.03	1.11	1.20	1.28	1.37	1.45	1.54	1.63	1.71	1.80	1.88	1.97	2.05	2.14	2.22	2.31	2.39	2.48	2.57	2.65	
	550	0.99	1.08	1.17	1.26	1.35	1.44	1.53	1.61	1.70	1.79	1.88	1.97	2.06	2.15	2.24	2.33	2.42	2.51	2.60	2.69	2.78	
	600	1.03	1.12	1.22	1.31	1.41	1.50	1.59	1.69	1.78	1.87	1.97	2.06	2.15	2.25	2.34	2.44	2.53	2.62	2.72	2.81	2.90	
	650	1.07	1.17	1.27	1.37	1.46	1.56	1.66	1.76	1.85	1.95	2.05	2.15	2.24	2.34	2.44	2.54	2.63	2.73	2.83	2.93	3.02	
	700	1.11	1.21	1.32	1.42	1.52	1.62	1.72	1.82	1.92	2.02	2.13	2.23	2.33	2.43	2.53	2.63	2.73	2.83	2.93	3.04	3.14	
	750	1.15	1.26	1.36	1.47	1.57	1.68	1.78	1.89	1.99	2.10	2.20	2.30	2.41	2.51	2.62	2.72	2.83	2.93	3.04	3.14	3.25	
	800	1.19	1.30	1.41	1.51	1.62	1.73	1.84	1.95	2.06	2.16	2.27	2.38	2.49	2.60	2.70	2.81	2.92	3.03	3.14	3.25	3.35	
	850	1.23	1.34	1.45	1.56	1.67	1.78	1.90	2.01	2.12	2.23	2.34	2.45	2.56	2.68	2.79	2.90	3.01	3.12	3.23	3.35	3.46	
	900	1.26	1.38	1.49	1.61	1.72	1.84	1.95	2.07	2.18	2.30	2.41	2.52	2.64	2.75	2.87	2.98	3.10	3.21	3.33	3.44	3.56	
	950	1.30	1.41	1.53	1.65	1.77	1.89	2.00	2.12	2.24	2.36	2.48	2.59	2.71	2.83	2.95	3.07	3.18	3.30	3.42	3.54	3.65	
	1000	1.33	1.45	1.57	1.69	1.81	1.94	2.06	2.18	2.30	2.42	2.54	2.66	2.78	2.90	3.02	3.14	3.27	3.39	3.51	3.63	3.75	
	1050	1.36	1.49	1.61	1.74	1.86	1.98	2.11	2.23	2.35	2.48	2.60	2.73	2.85	2.97	3.10	3.22	3.35	3.47	3.59	3.72	3.84	
	1100	1.40	1.52	1.65	1.78	1.90	2.03	2.16	2.28	2.41	2.54	2.66	2.79	2.92	3.04	3.17	3.30	3.43	3.55	3.68	3.81	3.93	
	1150	1.43	1.56	1.69	1.82	1.95	2.08	2.21	2.33	2.46	2.59	2.72	2.85	2.98	3.11	3.24	3.37	3.50	3.63	3.76	3.89	4.02	
	1200	1.46	1.59	1.72	1.86	1.99	2.12	2.25	2.39	2.52	2.65	2.78	2.92	3.05	3.18	3.31	3.45	3.58	3.71	3.84	3.98	4.11	

NOTES:

(1) See Section 2.13.4.2.2 of ASME A17.1 Safety Code for Elevators for detail

(2) See Section 2.13.4.2.1 of ASME A17.1 Safety Code for Elevators for detail

Kinetic Energy Formula

$$\frac{1}{2} \left(\frac{M}{32.2} \right) \left(V \right)^2 = 7.37 \text{ ft-lbf}$$

M = Combined Weight of Car and Hoistway Doors and All Attached Equipment

V = Speed in Feet Per Second

Table 6-10 Center Parting Doors without Reopening Device (Nudging)

MINIMUM CLOSING TIME FOR CENTER PARTING DOORS WITHOUT RE-OPENING DEVICE (NUDGING) (sec)		26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66
Door Opening Width (inch)	(1) Code Zone Distance (inch)	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
(2) Combined Weight of Car and Hoistway Doors and All Attached Equipment (lbs)	100	0.72	0.79	0.85	0.92	0.99	1.05	1.12	1.18	1.25	1.31	1.38	1.44	1.51	1.58	1.64	1.71	1.77	1.84	1.90	1.97	2.04
	150	0.88	0.97	1.05	1.13	1.21	1.29	1.37	1.45	1.53	1.61	1.69	1.77	1.85	1.93	2.01	2.09	2.17	2.25	2.33	2.41	2.49
	200	1.02	1.11	1.21	1.30	1.39	1.49	1.58	1.67	1.76	1.86	1.95	2.04	2.14	2.23	2.32	2.41	2.51	2.60	2.69	2.79	2.88
	250	1.14	1.25	1.35	1.45	1.56	1.66	1.77	1.87	1.97	2.08	2.18	2.28	2.39	2.49	2.60	2.70	2.80	2.91	3.01	3.12	3.22
	300	1.25	1.37	1.48	1.59	1.71	1.82	1.93	2.05	2.16	2.28	2.39	2.50	2.62	2.73	2.84	2.96	3.07	3.19	3.30	3.41	3.53
	350	1.35	1.47	1.60	1.72	1.84	1.97	2.09	2.21	2.33	2.46	2.58	2.70	2.83	2.95	3.07	3.19	3.32	3.44	3.56	3.69	3.81
	400	1.44	1.58	1.71	1.84	1.97	2.10	2.23	2.36	2.50	2.63	2.76	2.89	3.02	3.15	3.28	3.42	3.55	3.68	3.81	3.94	4.07
	450	1.53	1.67	1.81	1.95	2.09	2.23	2.37	2.51	2.65	2.79	2.93	3.07	3.20	3.34	3.48	3.62	3.76	3.90	4.04	4.18	4.32
	500	1.62	1.76	1.91	2.06	2.20	2.35	2.50	2.64	2.79	2.94	3.08	3.23	3.38	3.52	3.67	3.82	3.97	4.11	4.26	4.41	4.55
	550	1.69	1.85	2.00	2.16	2.31	2.46	2.62	2.77	2.93	3.08	3.23	3.39	3.54	3.70	3.85	4.00	4.16	4.31	4.47	4.62	4.77
	600	1.77	1.93	2.09	2.25	2.41	2.57	2.73	2.90	3.06	3.22	3.38	3.54	3.70	3.86	4.02	4.18	4.34	4.50	4.67	4.83	4.99
	650	1.84	2.01	2.18	2.34	2.51	2.68	2.85	3.01	3.18	3.35	3.52	3.68	3.85	4.02	4.19	4.35	4.52	4.69	4.86	5.02	5.19
	700	1.91	2.09	2.26	2.43	2.61	2.78	2.95	3.13	3.30	3.48	3.65	3.82	4.00	4.17	4.34	4.52	4.69	4.87	5.04	5.21	5.39
	750	1.98	2.16	2.34	2.52	2.70	2.88	3.06	3.24	3.42	3.60	3.78	3.96	4.14	4.32	4.50	4.68	4.86	5.04	5.22	5.40	5.58
	800	2.04	2.23	2.41	2.60	2.79	2.97	3.16	3.34	3.53	3.72	3.90	4.09	4.27	4.46	4.64	4.83	5.02	5.20	5.39	5.57	5.76
	850	2.11	2.30	2.49	2.68	2.87	3.06	3.26	3.45	3.64	3.83	4.02	4.21	4.40	4.60	4.79	4.98	5.17	5.36	5.55	5.74	5.94
	900	2.17	2.36	2.56	2.76	2.96	3.15	3.35	3.55	3.74	3.94	4.14	4.33	4.53	4.73	4.93	5.12	5.32	5.52	5.71	5.91	6.11
	950	2.23	2.43	2.63	2.83	3.04	3.24	3.44	3.64	3.85	4.05	4.25	4.45	4.66	4.86	5.06	5.26	5.47	5.67	5.87	6.07	6.28
	1000	2.28	2.49	2.70	2.91	3.12	3.32	3.53	3.74	3.95	4.15	4.36	4.57	4.78	4.98	5.19	5.40	5.61	5.82	6.02	6.23	6.44
	1050	2.34	2.55	2.77	2.98	3.19	3.41	3.62	3.83	4.04	4.26	4.47	4.68	4.89	5.11	5.32	5.53	5.75	5.96	6.17	6.38	6.60
	1100	2.40	2.61	2.83	3.05	3.27	3.49	3.70	3.92	4.14	4.36	4.57	4.79	5.01	5.23	5.45	5.66	5.88	6.10	6.32	6.53	6.75
	1150	2.45	2.67	2.90	3.12	3.34	3.56	3.79	4.01	4.23	4.45	4.68	4.90	5.12	5.35	5.57	5.79	6.01	6.24	6.46	6.68	6.90
	1200	2.50	2.73	2.96	3.19	3.41	3.64	3.87	4.10	4.32	4.55	4.78	5.01	5.23	5.46	5.69	5.92	6.14	6.37	6.60	6.83	7.05

NOTES:

(1) See Section 2.13.4.2.2 of ASME A17.1 Safety Code for Elevators for detail

(2) See Section 2.13.4.2.1 of ASME A17.1 Safety Code for Elevators for detail

Kinetic Energy Formula

$$\frac{1}{2} \left(\frac{M}{32.2} \right) \left(V \right)^2 = 2.5 \text{ ft-lbf}$$

M = Combined Weight of Car and Hoistway Doors and All Attached Equipment

V = Speed in Feet Per Second

Table 6-11 Side Slide Doors

MINIMUM CLOSING TIME FOR SIDE SLIDE DOORS (sec)																							
Door Opening Width (inch)	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66		
(1) Code Zone Distance (inch)	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66
(2) Combined Weight of Car and Hoistway Doors and All Attached Equipment (lbs)	100	0.84	0.92	0.99	1.07	1.15	1.22	1.30	1.38	1.45	1.53	1.61	1.68	1.76	1.84	1.91	1.99	2.07	2.14	2.22	2.30	2.37	
	150	1.03	1.12	1.22	1.31	1.41	1.50	1.59	1.69	1.78	1.87	1.97	2.06	2.15	2.25	2.34	2.44	2.53	2.62	2.72	2.81	2.90	
	200	1.19	1.30	1.41	1.51	1.62	1.73	1.84	1.95	2.06	2.16	2.27	2.38	2.49	2.60	2.70	2.81	2.92	3.03	3.14	3.25	3.35	
	250	1.33	1.45	1.57	1.69	1.81	1.94	2.06	2.18	2.30	2.42	2.54	2.66	2.78	2.90	3.02	3.14	3.27	3.39	3.51	3.63	3.75	
	300	1.46	1.59	1.72	1.86	1.99	2.12	2.25	2.39	2.52	2.65	2.78	2.92	3.05	3.18	3.31	3.45	3.58	3.71	3.84	3.98	4.11	
	350	1.57	1.72	1.86	2.00	2.15	2.29	2.43	2.58	2.72	2.86	3.01	3.15	3.29	3.43	3.58	3.72	3.86	4.01	4.15	4.29	4.44	
	400	1.68	1.84	1.99	2.14	2.30	2.45	2.60	2.75	2.91	3.06	3.21	3.37	3.52	3.67	3.83	3.98	4.13	4.28	4.44	4.59	4.74	
	450	1.79	1.95	2.11	2.27	2.43	2.60	2.76	2.92	3.08	3.25	3.41	3.57	3.73	3.89	4.06	4.22	4.38	4.54	4.71	4.87	5.03	
	500	1.88	2.05	2.22	2.39	2.57	2.74	2.91	3.08	3.25	3.42	3.59	3.76	3.93	4.11	4.28	4.45	4.62	4.79	4.96	5.13	5.30	
	550	1.97	2.15	2.33	2.51	2.69	2.87	3.05	3.23	3.41	3.59	3.77	3.95	4.13	4.31	4.49	4.66	4.84	5.02	5.20	5.38	5.56	
	600	2.06	2.25	2.44	2.62	2.81	3.00	3.19	3.37	3.56	3.75	3.94	4.12	4.31	4.50	4.68	4.87	5.06	5.25	5.43	5.62	5.81	
	650	2.15	2.34	2.54	2.73	2.93	3.12	3.32	3.51	3.71	3.90	4.10	4.29	4.49	4.68	4.88	5.07	5.27	5.46	5.66	5.85	6.05	
	700	2.23	2.43	2.63	2.83	3.04	3.24	3.44	3.64	3.85	4.05	4.25	4.45	4.66	4.86	5.06	5.26	5.46	5.67	5.87	6.07	6.27	
	750	2.30	2.51	2.72	2.93	3.14	3.35	3.56	3.77	3.98	4.19	4.40	4.61	4.82	5.03	5.24	5.45	5.66	5.87	6.08	6.29	6.49	
	800	2.38	2.60	2.81	3.03	3.25	3.46	3.68	3.89	4.11	4.33	4.54	4.76	4.98	5.19	5.41	5.63	5.84	6.06	6.28	6.49	6.71	
	850	2.45	2.68	2.90	3.12	3.35	3.57	3.79	4.01	4.24	4.46	4.68	4.91	5.13	5.35	5.58	5.80	6.02	6.25	6.47	6.69	6.91	
	900	2.52	2.75	2.98	3.21	3.44	3.67	3.90	4.13	4.36	4.59	4.82	5.05	5.28	5.51	5.74	5.97	6.20	6.43	6.66	6.89	7.11	
	950	2.59	2.83	3.07	3.30	3.54	3.77	4.01	4.24	4.48	4.72	4.95	5.19	5.42	5.66	5.89	6.13	6.37	6.60	6.84	7.07	7.31	
	1000	2.66	2.90	3.14	3.39	3.63	3.87	4.11	4.35	4.60	4.84	5.08	5.32	5.56	5.81	6.05	6.29	6.53	6.77	7.02	7.26	7.50	
	1050	2.73	2.97	3.22	3.47	3.72	3.97	4.21	4.46	4.71	4.96	5.21	5.45	5.70	5.95	6.20	6.45	6.69	6.94	7.19	7.44	7.68	
	1100	2.79	3.04	3.30	3.55	3.81	4.06	4.31	4.57	4.82	5.07	5.33	5.58	5.84	6.09	6.34	6.60	6.85	7.10	7.36	7.61	7.87	
	1150	2.85	3.11	3.37	3.63	3.89	4.15	4.41	4.67	4.93	5.19	5.45	5.71	5.97	6.23	6.49	6.75	7.00	7.26	7.52	7.78	8.04	
	1200	2.92	3.18	3.45	3.71	3.98	4.24	4.51	4.77	5.04	5.30	5.57	5.83	6.10	6.36	6.63	6.89	7.16	7.42	7.69	7.95	8.22	

NOTES:

(1) See Section 2.13.4.2.2 of ASME A17.1 Safety Code for Elevators for detail

(2) See Section 2.13.4.2.1 of ASME A17.1 Safety Code for Elevators for detail

Kinetic Energy Formula

$$\frac{1}{2} \left(\frac{M}{32.2} \right) \left(V \right)^2 = 7.37 \text{ ft-lbf}$$

M = Combined Weight of Car and Hoistway Doors and All Attached Equipment

V = Speed in Feet Per Second

Table 6-12 Side Slide Doors without Re-Opening (Nudging) Device

MINIMUM CLOSING TIME FOR SIDE SLIDE DOORS WITHOUT RE-OPENING DEVICE (NUDGING) (sec)		26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66
Door Opening Width (inch)	(1) Code Zone Distance (inch)	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62
(2) Combined Weight of Car and Hoistway Doors and All Attached Equipment (lbs)	100	1.44	1.58	1.71	1.84	1.97	2.10	2.23	2.36	2.50	2.63	2.76	2.89	3.02	3.15	3.28	3.42	3.55	3.68	3.81	3.94	4.07
	150	1.77	1.93	2.09	2.25	2.41	2.57	2.73	2.90	3.06	3.22	3.38	3.54	3.70	3.86	4.02	4.18	4.34	4.50	4.67	4.83	4.99
	200	2.04	2.23	2.41	2.60	2.79	2.97	3.16	3.34	3.53	3.72	3.90	4.09	4.27	4.46	4.64	4.83	5.02	5.20	5.39	5.57	5.76
	250	2.28	2.49	2.70	2.91	3.12	3.32	3.53	3.74	3.95	4.15	4.36	4.57	4.78	4.98	5.19	5.40	5.61	5.82	6.02	6.23	6.44
	300	2.50	2.73	2.96	3.19	3.41	3.64	3.87	4.10	4.32	4.55	4.78	5.01	5.23	5.46	5.69	5.92	6.14	6.37	6.60	6.83	7.05
	350	2.70	2.95	3.19	3.44	3.69	3.93	4.18	4.42	4.67	4.91	5.16	5.41	5.65	5.90	6.14	6.39	6.63	6.88	7.13	7.37	7.62
	400	2.89	3.15	3.42	3.68	3.94	4.20	4.47	4.73	4.99	5.25	5.52	5.78	6.04	6.30	6.57	6.83	7.09	7.36	7.62	7.88	8.14
	450	3.07	3.34	3.62	3.90	4.18	4.46	4.74	5.02	5.29	5.57	5.85	6.13	6.41	6.69	6.97	7.24	7.52	7.80	8.08	8.36	8.64
	500	3.23	3.52	3.82	4.11	4.41	4.70	4.99	5.29	5.58	5.87	6.17	6.46	6.76	7.05	7.34	7.64	7.93	8.22	8.52	8.81	9.11
	550	3.39	3.70	4.00	4.31	4.62	4.93	5.24	5.54	5.85	6.16	6.47	6.78	7.09	7.39	7.70	8.01	8.32	8.63	8.93	9.24	9.55
	600	3.54	3.86	4.18	4.50	4.83	5.15	5.47	5.79	6.11	6.43	6.76	7.08	7.40	7.72	8.04	8.37	8.69	9.01	9.33	9.65	9.97
	650	3.68	4.02	4.35	4.69	5.02	5.36	5.69	6.03	6.36	6.70	7.03	7.37	7.70	8.04	8.37	8.71	9.04	9.38	9.71	10.05	10.38
	700	3.82	4.17	4.52	4.87	5.21	5.56	5.91	6.26	6.60	6.95	7.30	7.65	7.99	8.34	8.69	9.04	9.38	9.73	10.08	10.43	10.77
	750	3.96	4.32	4.68	5.04	5.40	5.76	6.12	6.47	6.83	7.19	7.55	7.91	8.27	8.63	8.99	9.35	9.71	10.07	10.43	10.79	11.15
	800	4.09	4.46	4.83	5.20	5.57	5.94	6.32	6.69	7.06	7.43	7.80	8.17	8.54	8.92	9.29	9.66	10.03	10.40	10.77	11.15	11.52
	850	4.21	4.60	4.98	5.36	5.74	6.13	6.51	6.89	7.28	7.66	8.04	8.42	8.81	9.19	9.57	9.96	10.34	10.72	11.11	11.49	11.87
	900	4.33	4.73	5.12	5.52	5.91	6.30	6.70	7.09	7.49	7.88	8.28	8.67	9.06	9.46	9.85	10.25	10.64	11.03	11.43	11.82	12.22
	950	4.45	4.86	5.26	5.67	6.07	6.48	6.88	7.29	7.69	8.10	8.50	8.91	9.31	9.72	10.12	10.53	10.93	11.34	11.74	12.15	12.55
	1000	4.57	4.98	5.40	5.82	6.23	6.65	7.06	7.48	7.89	8.31	8.72	9.14	9.55	9.97	10.38	10.80	11.22	11.63	12.05	12.46	12.88
	1050	4.68	5.11	5.53	5.96	6.38	6.81	7.24	7.66	8.09	8.51	8.94	9.36	9.79	10.22	10.64	11.07	11.49	11.92	12.34	12.77	13.19
	1100	4.79	5.23	5.66	6.10	6.53	6.97	7.41	7.84	8.28	8.71	9.15	9.58	10.02	10.46	10.89	11.33	11.76	12.20	12.63	13.07	13.50
	1150	4.90	5.35	5.79	6.24	6.68	7.13	7.57	8.02	8.46	8.91	9.35	9.80	10.25	10.69	11.14	11.58	12.03	12.47	12.92	13.36	13.81
	1200	5.01	5.46	5.92	6.37	6.83	7.28	7.74	8.19	8.65	9.10	9.56	10.01	10.47	10.92	11.38	11.83	12.29	12.74	13.20	13.65	14.11

NOTES:

- (1) See Section 2.13.4.2.2 of ASME A17.1 Safety Code for Elevators for detail
 (2) See Section 2.13.4.2.1 of ASME A17.1 Safety Code for Elevators for detail

Kinetic Energy Formula

$$\frac{1}{2} \left(\frac{M}{32.2} \right) \left(V \right)^2 = 2.5 \text{ ft-lbf}$$

M = Combined Weight of Car and Hoistway Doors and All Attached Equipment
 V = Speed in Feet Per Second

Visit Log and Call Back Forms

Check Each Monthly Visit		JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	Description / Additional
Controller	Excessive dust, debris, moisture													
	Proper status indicator operation													
	Fault indication / Fault logs													
	Connection security													
Safeties	Control room / space cleanliness, environment													
	Visible damage													
Safeties	Proper linkages / condition													
	Rail clearance 7, 8													
	Rope lubrication													
	Sheave alignment													
Suspension Rope	Ride car: leveling accuracy, ride quality													
	Rope condition													
Overspeed Governor	Isolation springs / hitch plates													
	Rope dry and clean													
	Rope unobstructed													
	Linkages, gears, pins, bushings, latches													
Guide Rails	Check switches and reset mechanism													
	Visual damage / distortion check													
	Governor and tension weight sheaves													
	All fastenings secure													
Buffers	Rails clean and rust free													
	Rail lubrication													
	Visual check alignment / fastenings													
	Visual check roller guides													
Machine	Roller guide lubrication													
	Mounting													
	Vertical alignment													
	Leakage (oil buffers)													
Doors	Distortion													
	Correct uncompressed height													
	Wear, debris, leakage, overheating													
	Clean with dry cloth													
General	Operation													
	Encoder connections / cleanliness													
	Re-opening devices													
	Closing force													
Every Six Months Minimum	Doors, tracks, locks													
	Switches / signals / buttons													
	Position sensor check / clean													
	Car top station switches / locks / cleanliness													
Date Checked	Machine space environment clean / dry													
	Seismic devices													
	Pit clean / dry													
	Pit switches													
Technician Name or Initials	Rope tension													
	Rope diameter / condition / data tag													
	Governor structure / lubrication													
	Check oil level or springs correctly seated													
State Install #:	Check brake lining / adjust if required													
	Lubricate machine, brake pins, bearings													
	Check, clean, lubricate door operator													

Routinely examine, lubricate, clean, & adjust equipment to perform according to equipment specifications and code requirements. These are MINIMUM guidelines. Harsh conditions or heavy use may require more frequent service. If you have questions about service requirements, contact Motion Control Engineering at 916-463-9200. These are routine tasks. Use a different form for trouble reports or callbacks.

Service Requests, Callbacks, Test Results

[illegible]

Site: _____ Elevator: _____ State Installation #: _____

Detailed Checklist

Pit

Buffers

- Securely fastened
- Vertical and aligned with strike plates
- Correct extended height
- Spring
 - Complete
 - Properly seated
 - No distortion or damage
- Oil
 - Check for leakage
 - Check oil level
 - Check switch function

Compensation

- Securely fastened
- Hangers in good condition
- No contact with obstructions
- No contact with pit floor
- Check pull out switch (if used)
- Check anti-sway (if used)

Pit Stop Switch

Pit Lighting

Clean Pit

Rails

- Securely fastened
- Joints aligned
- Clean
- Lubricate if appropriate

Seismic Zones

- Check anti-derailment guides
- Check seismic sensor
- Check counterweight sensor

Safeties

- Clean
- Lubricate
- Check linkages
- Check securely fastened
- Check jaw clearances

Car Bottom

- Check sheave condition
- Check rope condition
- Check sheave guards are secure and aligned
- Check sling condition

Elgo Positioning System

- Check spring tension
- Check rail attachments
- Check tape alignment
- Check tape condition

Governor Sheave

- Check sheave condition
- Check rope condition
- Check rope is clean and dry
- Check tension weight clearances
- Check slack rope switch
- Lubricate pivot points

Roller Guides

- Clean
- Lubricate
- Check alignment and clearances
- Check for signs of wear
- Check securely fastened
- Check blade wheel traction

Counterweight

- Frame condition and fastenings
- Filler retainers
- Clean roller guides
- Lubricate roller guides
- Check for indication of roller guide wear
- Check guides are secure
- Check blade wheel traction
- Check seismic sensor
- Check rope condition
- Check sheave condition
- Check runby within specification for job

Overhead

Lighting

Access Port Switch

Emergency Stop Switch / Disconnect

Overspeed Governor

- Clean
- Lubricate pivot points
- Check securely fastened
- Check for signs of damage or distortion
- Check sheave condition
- Check rope condition
- Check rope is clean and dry
- Check overspeed switches
- Check remote reset function

Roller Guides

- Clean
- Lubricate
- Check alignment and clearances
- Check for signs of wear
- Check securely fastened
- Check blade wheel traction

Locking Bolt

- Clean
- Lubricate
- Check switch
- Check securely fastened

Inspection Station

- Clean
- Check switch operation
- Check light
- Check car top outlet

Rails

- Check condition
- Check alignment
- Check fastenings

Hoist Machine

- Clean
- Check lubrication
- Check sheave condition
- Check rope condition
- Examine Brake
 - Check lining
 - Check adjustment
 - Lubricate pivot points
 - Check brake switches
 - Check brake lift / drop / drag
 - Check emergency shoe operation

Positioning System

- Clean
- Lubricate
- Check securely fastened
- Elgo
 - Check tape condition
 - Check sensor/tape alignment
- iControl
 - Check encoding wheel alignment
 - Check encoding wheel tension
 - Check door / leveling magnets
 - Check sensor to magnet clearances

Door Operator

- Clean
- Lubricate
- Check belts and/or chains
- Check linkages
- Check switches
- Check securely fastened

Rescue System

- Check camera mount
- Clean camera lens

Hoistway

Lighting

Ropes

- Lubricate as needed
- Clean if needed
- Check rope tension
- Check rope diameter
- Check strand condition
- Check for no obstructions
- Check for sheave wear / alignment
- Check rope height in grooves

Rails

- Secure
- Properly aligned
- Clean if needed

Hoistway Switches

- Check all switches are securely mounted
- Check all switches are functional

Traveling Cable

- Check securely fastened
- Check unobstructed
- Check anti sway if used
- Check traveling cable does not contact hoistway wall or pit floor

Rescue System

- Check leveling zone / floor indicators are in position and legible

Landing Doors

- Clean
- Lubricate
- Check closers
- Check gibs
- Check sills
- Check door locks

Control Space**Lighting****Controller**

- Vacuum
- Check ambient temperature
- Check humidity
- If controller has A/C: Check drainage; Clean unit; Lubricate; Check refrigerant
- Check drive connections
- Check brake and motor contactor condition
- Check fuses
- Check rescue system battery
- Check rescue system video
- Check rescue system controls/ operation
- Check emergency brake operation
- Check emergency power disconnect
- Clean TAPS unit
- Check TAPS operation

Car**Doors**

- Clean track and hangers
- Lubricate track and hangers
- Check door operation
- Check clutch operation
- Check pick up wheels
- Check restrictor and linkages
- Check door closing forces
- Check door re-opening devices
- Check door limit and position switches

Car Lighting

COP

- Condition
- Operation
- Indicators

Ride

- Check leveling accuracy
- Check ride quality, acceleration, deceleration
- Check position indicators

Fire Operation

- Check recall operation
- Check Phase II operation

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